SIEMENS

SIMOCRANE

Crane Management System (CMS)

System Manual

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Valid for version 4.1 SP1

03/2011

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Preface

Product brief

This document is part of the SIMOCRANE CMS product package. It describes the design and functionality of SIMOCRANE CMS based on SIMATIC WinCC and the SIMOCRANE CMS add-on package for adding specific crane management system functions to SIMATIC WinCC.

SIMOCRANE CMS provides the basis for realizing information systems locally for the crane (CMS) and centrally for the plant (RCMS). These systems assist the user in operation and troubleshooting.

The scope of functions offered by SIMOCRANE CMS include:

- Graphic visualization of the crane at CMS level and a graphic overview of the entire plant at RCMS level
- Alarm/event system and support for diagnostics
- Recording measured values for various operating parameters
- Recording and analysis of cargo handling data
- Recording and analysis of operating hours and counters
- Process data interfaces to various automation systems
- Standard interfaces to higher-level logistics systems
- Data transfer between CMS stations and an RCMS server
- Analysis of operational data as well as recording and analysis of downtimes at RCMS level

The user interfaces at CMS and RCMS level are structured with a focus on user groups and offer various users the corresponding information and functions for their respective area of work.

As a basis for configuring a CMS station, two standard applications are supplied for the CMS and RCMS levels in the CMS add-on package. The standard application includes the functions of the crane management system described above. This document describes how the standard applications can be adapted to various project requirements.

Demarcation

SIMOCRANE CMS provides various tools for implementing the CMS functionality required. It is not a ready-to-run crane management system.

Area of application

The system is designed for use on cranes and for harbour and industrial environments. The SCADA product used allows the adaptation to various applications. Thanks to its scalability, anything from CMS single-user systems right through to networked CMS infrastructures can be installed.

Content

The document provides information on the following areas:

Target groups and level of knowledge

This document addresses various target groups. For these target groups, the following knowledge is required:

• Sales & Marketing	General knowledge about the scope of the WinCC function
• Engineering	Good knowledge of WinCC
• Commissioning supervisors	Good knowledge of WinCC

Products / product combinations

The SIMOCRANE CMS WinCC add-on, the standard application supplied, and the supplementary WinCC options will be introduced with regard to different areas of use.

Functionality

The document describes the scope of functions of SIMOCRANE CMS.

In addition to single-user systems for one CMS station on a crane, multi-user topologies and RCMS options are also described. The RCMS options contain information about remote access to a CMS station and installation of an RCMS server.

Assigning parameters and addressing

In a few simple steps, you can start the standard application in your own environment, make default settings or enter project-specific data (messages, operational data, ...). Various controllers can be connected to WinCC.

Configuring

Using standard WinCC tools and settings in the CMS Editor, the standard application can be adapted to different project preconditions.

Administration of hardware

PCs or other display devices form the basis of the operator stations. Software must be installed depending on the application.

Interfaces

The interface between the CMS application and the crane controller is described in detail.

Style guide

The CMS standard application has been created in accordance with certain design points and configuration guidelines. These should simplify project-specific expansions of the standard application.

Document structure

Different chapters of the document will be of interest to different target groups. Each chapter starts with a summary of its main content.

All chapters featuring work instructions for the reader are split into three sections:

- Initial situation:
  What functions/configurations are existing (in the CMS standard application, WinCC, PC, etc.)?
- Processing steps / operator actions:
  What processing steps need to be performed to adapt the initial situation to other requirements?
- Result:
  What are the impacts of the changes?

Additional information

Technical Support

If you have any technical questions, please contact our hotline (worldwide):

Phone: +49 (180) 50 50 222
Fax: +49 (180) 50 50 223
Internet: http://www.siemens.de/automation/support-request

Siemens Internet addresses

You can find information about crane solutions on the Internet at
http://www.siemens.com/cranes

You can find information about SIMOCRANE products, product support and FAQs on the Internet at http://support.automation.siemens.com/WW/view/en/10807397/130000

Additional support

We also offer courses to help you familiarize yourself with SIMOCRANE and its principle operation. To do this, please contact your local Siemens sales office.

If you have any questions about crane applications, please send an e-mail to the following address:
applications.cranes.aud @siemens.com

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Product group

1

This chapter describes the fundamental product structure of SIMOCRANE CMS. This chapter is therefore mainly aimed at people working in project planning, i.e. people who have to define a crane management system for specific project requirements.

1.1 Product structure

SIMOCRANE CMS is not a ready-to-run crane management system. SIMOCRANE CMS provides various tools for implementing the CMS functionality required. The CMS standard application supplied already covers a high level of functionality and is therefore a good starting point for quickly realizing customer-specific solutions.

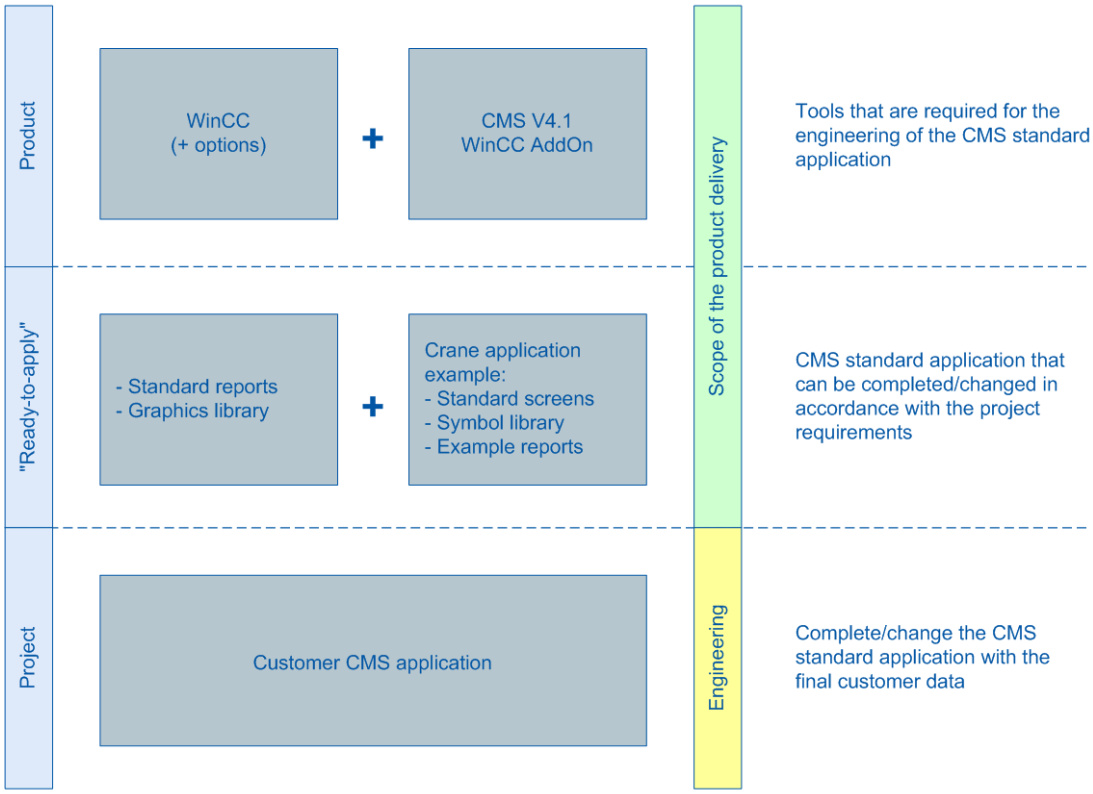


Figure 1-1 Product structure of SIMOCRANE CMS

1.2 SIMATIC WinCC

The SIMATIC WinCC software forms the core for the SIMOCRANE CMS crane management system.

The basic WinCC software offers the most important functions of a SCADA system encountered in crane applications.

- User administration:

  Issuing and checking user access rights both for configuration and the runtime environment. As of WinCC V7, SIMATIC Logon is part of the basic WinCC software. SIMATIC Logon integrates itself into the security system and the user administration of Windows.

- Visualization:

  The basic WinCC software assists with the configuration of individual user interfaces through the provision of standard objects. This includes, for example, simple standard objects such as lines or rectangles, common graphic objects, buttons and input/output fields, picture windows, OLE objects,and ActiveX Controls.

- Alarm/event system:

  The alarm/event system records process messages and local events and archives them in cyclic archives. The archived messages are displayed in an ActiveX Control. The type of message procedure and archiving can be configured.

- Process value archiving:

  Historical values and value patterns are saved in process value archives. The type of recording and archiving can be configured.

- Protocol system:

  The protocol system is used to save or print data from WinCC in fixed layouts as files.

- Configuration of mass data:

  WinCC projects can be edited in MS Excel using an extra tool.

Since WinCC is commonly used as a standard product, support and expertise are widely available across the world. WinCC provides integrated data archiving for messages and process values on the basis of MS SQL Server. Other benefits of WinCC include scalability, expandability, and transparency.

Scalability

SIMATIC WinCC can be used to configure anything from single-user systems right through to networked structures. The topology can be extended for various crane system requirements.

Expandability

Thanks to its modular software structure and open interfaces, the basic system can be adapted to the various requirements of a crane system using the WinCC options or add-ons.

Transparency

Different communication channels, based on protocols used around the world such as TCP/IP, PROFIBUS or OPC, not only allow for connection to SIMATIC S7 controllers, but also connection to controllers of other well-known manufacturers. The open interfaces allow for connection to higher-level systems and the development of dedicated applications.

1.3 SIMOCRANE CMS add-on package

The SIMOCRANE CMS add-on package adds crane-specific requirements to the WinCC basic system.

The add-on package includes an editor, which is integrated into WinCC Explorer once the add-on package has been installed, and a runtime component (CMS Runtime). Graphic controls are provided in the WinCC Graphics Designer.

In the editor, parameters can be set for the functions of the CMS add-on package for various crane applications which are performed by the CMS Runtime.

The add-on package offers the following functions:

- It expands WinCC Alarm Logging by the option of saving additional information about messages and displaying them in runtime in the graphic controls.
- The "PLC reference" function enables users to jump to the STEP 7 editor (STEP 7 installation required).
- Event-controlled recording of operational data (cargo handling data, counters) from the crane controller
- Data transfer (operational data, messages, and values of the WinCC tags) between CMS stations and an RCMS server. As well as runtime data, configuration data is also exchanged to make it easier to configure an RCMS server.
- Tree view of individual cranes in a terminal view to select a crane in order to view its acquired data on the RCMS server.
- Import/export functions for configuring mass data
- Trace Viewer for displaying fast trace data (acquisition cycle < 500 ms).

1.4 SIMOCRANE CMS standard application

The CMS standard application is a WinCC project. The standard application uses the functionality of SIMATIC WinCC and the SIMOCRANE CMS add-on, and therefore represents a standard crane application. This combination of SIMATIC WinCC and SIMOCRANE CMS add-on supports the following functions:

- Condition monitoring
- Fault diagnostics
- Recording operational data

- Reporting
- Integrating the Trace Viewer

The RCMS sample application includes an example of a plant view, the tree view of several cranes, and examples for the analysis of operational data and downtimes.

1.5 SIMATIC WinCC options and certified add-ons

The options and add-ons described below are applied in various combinations to cover additional functions.

1.5.1 SIMATIC WinCC / Web Navigator

The WinCC/Web Navigator extends CMS functionality by providing a remote-access option. You can use the WinCC / Web Navigator to operate and observe a plant comprising various stations via the Intranet or Internet. This does not require any changes to the WinCC project.

The Web Navigator is needed in the crane environment if

- remote access to the local CMS station is required (e.g. from the RCMS server).
- other HMI devices besides the electrical room PC are needed on the crane itself (crane cabin, checker cabin).

The Web Navigator server is installed on the CMS station in the crane's electrical room. A web navigator client can be setup on any Windows PC at the crane itself, at an RCMS server or on other RCMS devices. The web client allows the WinCC project, running on the CMS station, to be operated and visualized from MS Internet Explorer. Just like the WinCC basic operator station, virtually all possible displays and operations are available to the web client.

1.5.2 WinCC / Data Monitor

The WinCC Data Monitor is an option for extended analysis of operational data and messages from the WinCC archives.

The Data Monitor is particularly suited to use on the RCMS server. Here, the collected data from all CMS stations connected to the RCMS server is available to the Data Monitor. You can also use the Data Monitor on the CMS station if there is no RCMS server or none has been planned.

Analysis results can be conveniently produced via Internet Explorer and published for other users. Internet Explorer can be used to access this data on office PCs if the PC in question has Internet or network access to the corresponding CMS station.

In addition to the options for data analysis, the Data Monitor also provides you with Web Navigator sub-functions. The "Process Screens" offer a pure observing function for WinCC screens. HMI devices which are only to be used for observation rather than operational purposes do not therefore require a license for the Web Navigator.

1.5.3 WinCC / Downtime Monitor

The WinCC / Downtime Monitor can be used to record and analyze the behavior of the entire crane system with regard to reducing the downtimes of single cranes. The Downtime Monitor was originally developed for machine-oriented or line-oriented manufacturing plants but is also easy to use in a crane environment. It is especially suited as application on the RCMS server for analysis of the connected single cranes of a plant.

The Downtime Monitor helps to answer the following questions:

- What is the actual performance of a crane compared with the planned performance?
- How is load distributed over the cranes (where is there full load and where no-load operation)?
- Why do comparable cranes constantly handle different numbers of standard containers (TEU – Twenty-foot Equivalent Unit)?

The Downtime Monitor records downtimes and the reasons for them and calculates specific parameters (KPI = Key Performance Indicators) so that terminal availability and productivity can be increased in the future.

The shift calendar provided can also be used to include work shifts on the crane in the analysis and to compare these with each other.

The system offers various display types for analysis results in WinCC Controls:

- Gantt chart for overview of operating states of different cranes in one overview or over different periods.
- Bar charts or sub-divided bar charts, Pareto diagrams or trends for displaying the key performance indicators such as availability, performance, MMBF, productivity (containers per hour). The data can be grouped by type, period, or shift.
- Tables showing overview of plant states over different periods. The data can be printed out or exported in csv format.

1.5.4 WinCC server

The WinCC client server topology is the right solution at RCMS level. One or more WinCC servers act as a data collector for data from the connected CMS stations.

The servers support central operator stations as WinCC clients to which data from all cranes is made available (RCMS operator stations).

1.5.5 Certified system diagnostics add-on

The system diagnostics provide visualization of the topology and field devices, and offer detailed node diagnostics. This facility is integrated into WinCC, and is available for both PROFIBUS and PROFINET.

The status of the CPU or I/O modules and the entire network can be visualized in clear displays. Detailed pages for each module contain further information. The display is based on the SIMATIC S7 conventions. Depending on the features of this add-on, a corresponding block will need to be integrated into the S7 program for the purpose of data supply.

Precise details of the functional scope and range of modules supported are contained in the associated system description.

1.5.6 Certified PM-Maint add-on

The standard scope of the SIMOCRANE CMS package does not include a maintenance planning system. It does, however, provide all the data this would require (e.g. operating hours counter).

PM-MAINT is a sector- and technology-neutral tool for maintenance planning. PM-MAINT is recommended if a project requires this type of functionality.

PM-MAINT must be installed on the RCMS server. PM-MAINT supports client views for the operator stations of the RCMS servers.

PM-MAINT offers both calendar-controlled and event-controlled maintenance of components on different single cranes. PM-MAINT therefore assists with the timely maintenance of components in order to avoid the cost of premature maintenance or production outage and downtimes.

An import and export function supports the process of configuring mass data.

1.6 SIPLUS CMS

SIPLUS CMS is a condition monitoring system. This allows data to be recorded with a data point interval of less than 500 ms.

Functions of CMS

2

This chapter provides an overview of the system design and main functions which the local CMS provides. Several sections list various ways of implementing a functionality which may be used depending on the project requirements.

2.1 System design

2.1.1 Applications

The CMS station is located at the crane. It can be operated as a single-user station (single-user CMS); however, it also permits combined operation of a CMS station in the electrical room with several client stations, for example, in the crane cabin or in the checker cabin (multi-user system).

Figure 2-1 CMS as a single-user station in the crane cabin

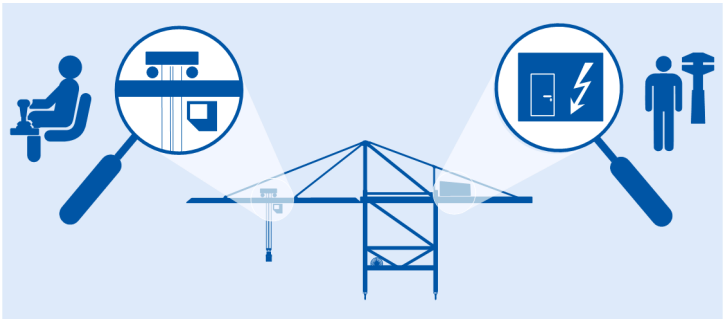


Figure 2-2 CMS multi-user system with several operator stations at the crane

2.1.2 Topology

SIMOCRANE CMS has as its basis a PC installed in the electrical room of a crane (local CMS station). The server component of the local CMS runs on this station on the basis of SIMATIC WinCC. The station is responsible for communication with the control level.

The local CMS station in the electrical room can be operated as a single-user station (single-user system), but also allows a CMS station in the electrical room to be operated in combination with several client stations, as are needed for example in the crane cabin or checker cabin (multi-terminal system). The following diagram shows the components for a CMS single-user system.

The PC operating system for the CMS station in the electrical room is Windows XP.

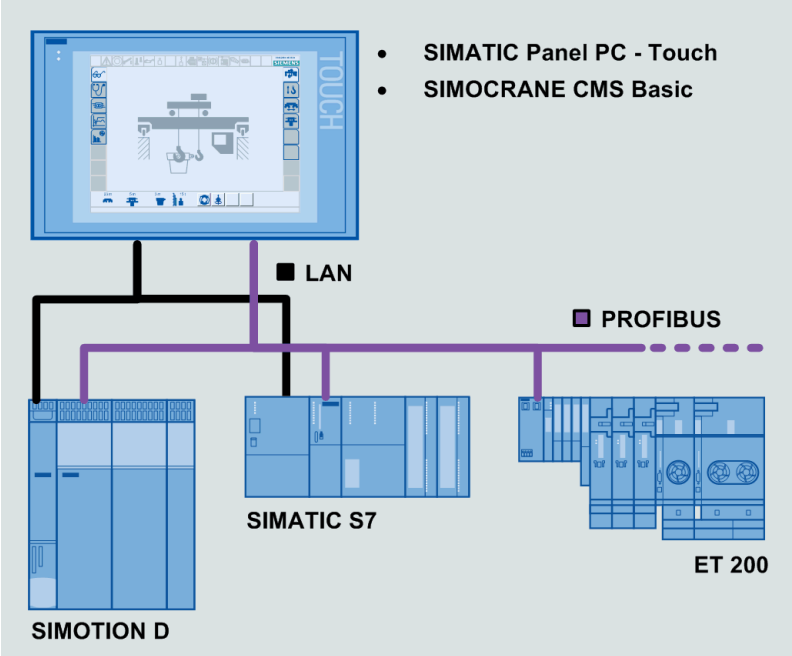


Figure 2-3 Single user system

The client stations in a multi-user system can be designed as PC-based web client stations depending on the actual requirement. The mechanism for accessing the CMS station is the WinCC Web Navigator.

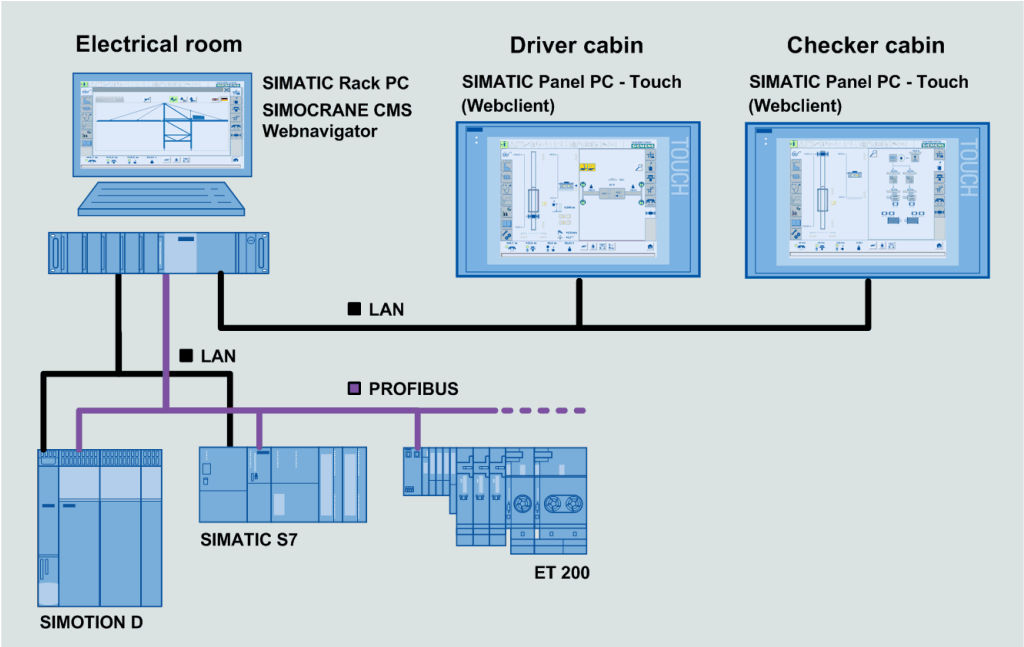


Figure 2-4 Multi-user system

2.1.3 Communications with the control level

The CMS add-on supports different standard communication protocols such as TCP/IP, PROFIBUS, and OPC on the basis of WinCC. This means that not only can you connect Siemens controllers to the CMS but also controllers from other manufacturers.

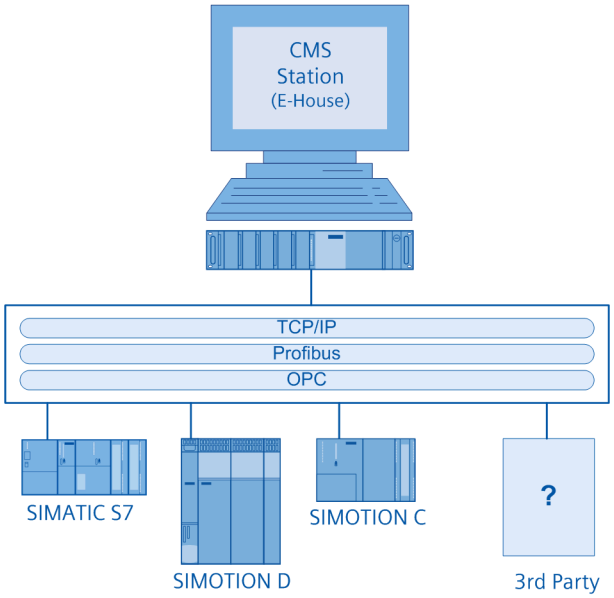


Figure 2-5 Communications with the crane controller

2.2 Design of user interface

When designing the CMS user interface on the basis of SIMATIC WinCC, the following aspects were especially taken into consideration:

Screen elements

- Symbolic representation instead of realistic graphics:

  One design aspect is the use of simple but significant symbols to display screen objects. An independent look is presented with a few graphical details.

- Touch operation:

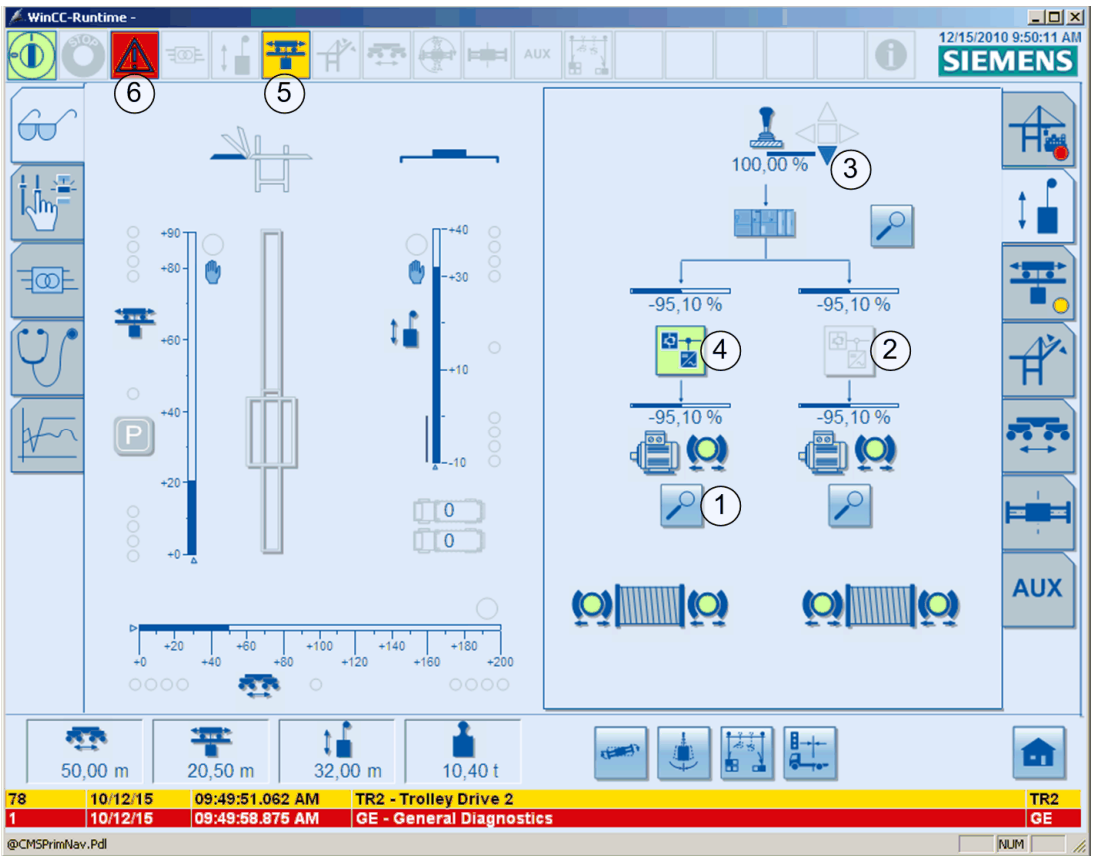
  In terms of size, the control elements are large enough that they can be operated in the touch mode.

Color concept

The color range offered by the user interface is reduced to a small selection, so that the user can quickly distinguish between key events (warnings and faults) and the normal operating state.

The color philosophy uses the following color assignments:

Fill color	Blink color	Foreground color	Blink color	
222, 233, 248				Screen background
122, 176, 224		0, 85, 164		Control elements
222, 233, 248		182, 197, 207		Static elements, inactive elements
80, 103, 116		80, 103, 116		Trend background
0,85,164		0, 85, 164		Dynamic elements
222, 233, 248	204, 255, 153	182, 197, 207	0, 85, 164	Elements status ready
204, 255, 153		0, 85, 164		Elements active, info
255, 221, 0		0, 85, 164		Warnings
218, 4, 15		0, 85, 164		Faults



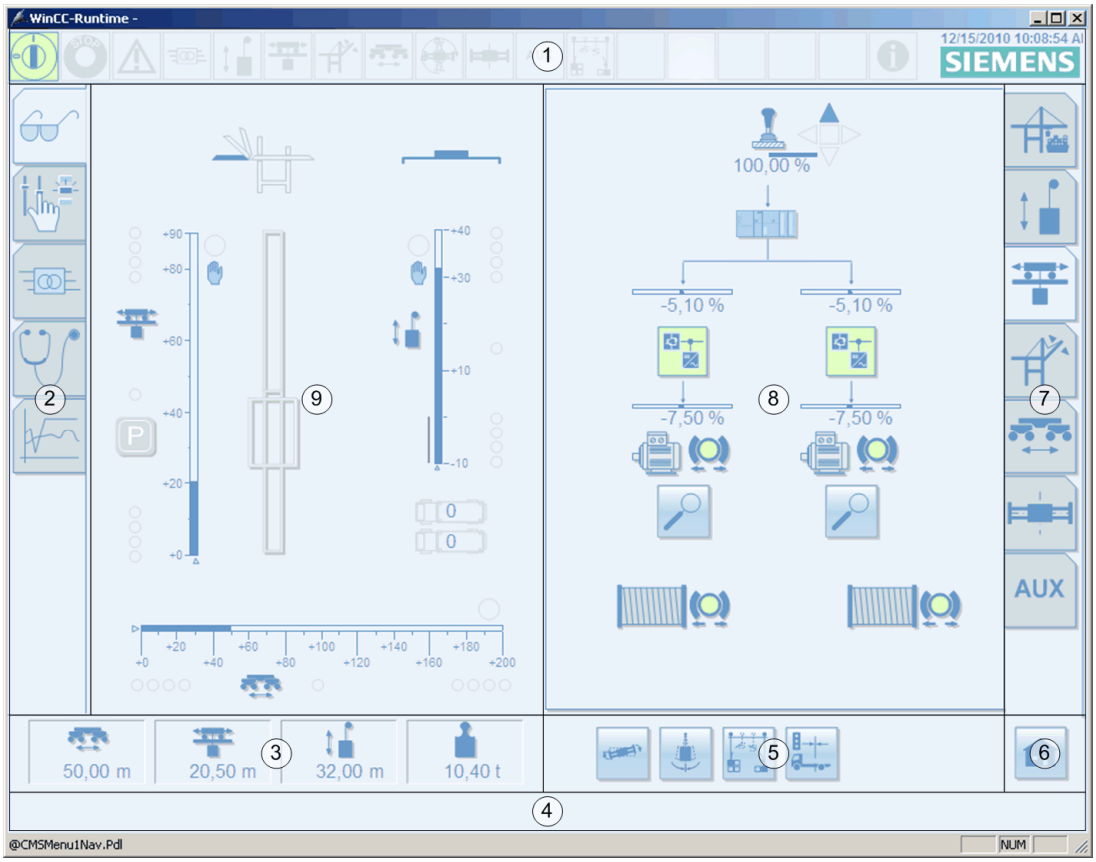
① Control element: Open details page
② Inactive element: Converter is switched off
③ Dynamic element: Direction of motion
④ Active element: Converter is active
⑤ Warning: Warning for trolley is active
⑥ Faults: General fault active

Figure 2-6 Color philosophy in the CMS

Screen structure

The user interface consists of fixed and dynamic components. The fixed display areas contain status and fault displays, which are always visible. The dynamic screen components enable navigation through detailed information and operating areas.

The following figure illustrates the structure of the user interface.



① Group fault bar: Displays general warnings and group faults
② Primary navigation bar: For toggling between the main CMS menus
③ Information bar: Displays important load and position data
④ Message line: Displays the current message
⑤ Operation bar: Activation / deactivation of additional technology functions
⑥ HOME button: Selects the CMS start page
⑦ Secondary navigation bar: Screen changeover within main menus (secondary screen content)
⑧ + ⑨ Screen content; can be switched using the navigation bar
⑧ Secondary screen content: Variable screen section which is switched over using secondary navigation. If there is no fixed primary screen content, all screen content is switched over.
⑨ Primary screen content: Fixed screen section which is permanently displayed within the main menu. Constant primary screen content does not exist in all main CMS menus.

Figure 2-7 Screen structure of the CMS user interface

The user can select from three screen levels when switching the screen over. The deeper you navigate into the levels, the more detailed the information. Access to detailed information is linked to the corresponding user rights.

- Level 1: Switching over the main menus (with or without primary screen content ⑨) using the primary navigation bar ②. Each main menu has its own secondary navigation bar.
- Level 2: Switching over of secondary screen content ⑧ using the secondary navigation bar ⑦.

- Level 3: Displaying detail windows. Detail windows can only be accessed with the corresponding user rights. The detail windows are displayed using control elements within the secondary screen content.

2.3 User groups

A distinction is made between four user groups and different rights are issued for them for the CMS user interfaces:

- Crane driver ("Operator")
- Maintenance staff ("Maintenance")
- User whose primary objective is to evaluate operational data ("Management")
- Administrator

Table 2- 1 CMS / RCMS user interface user groups

User right	Symbol	User name	Description
Crane driving		Operator	Standard user with few rights. The information displayed focuses on assisting crane drivers.
Maintenance		Maintenance	User with higher-level rights. The information displayed focuses on assisting with fault diagnostics and maintenance.
Manage		Management	User with higher-level rights. The information displayed focuses on the operational data.
Administration		Administrator	User with unrestricted rights.

2.4 Condition monitoring

Condition monitoring is simply an indication instrument. The state of the crane components along with the most important electrical, mechanical and hydraulic units for crane operations are graphically displayed, as are the states of the infeed and technology function components.

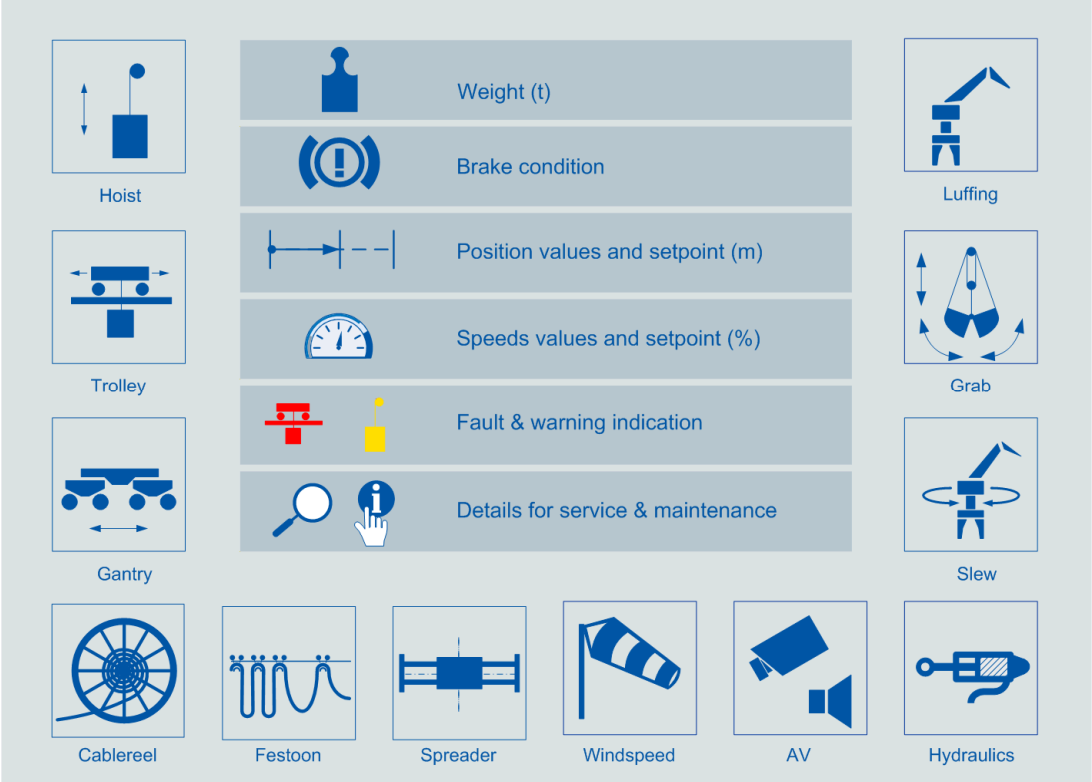


Figure 2-8 Overview, status display

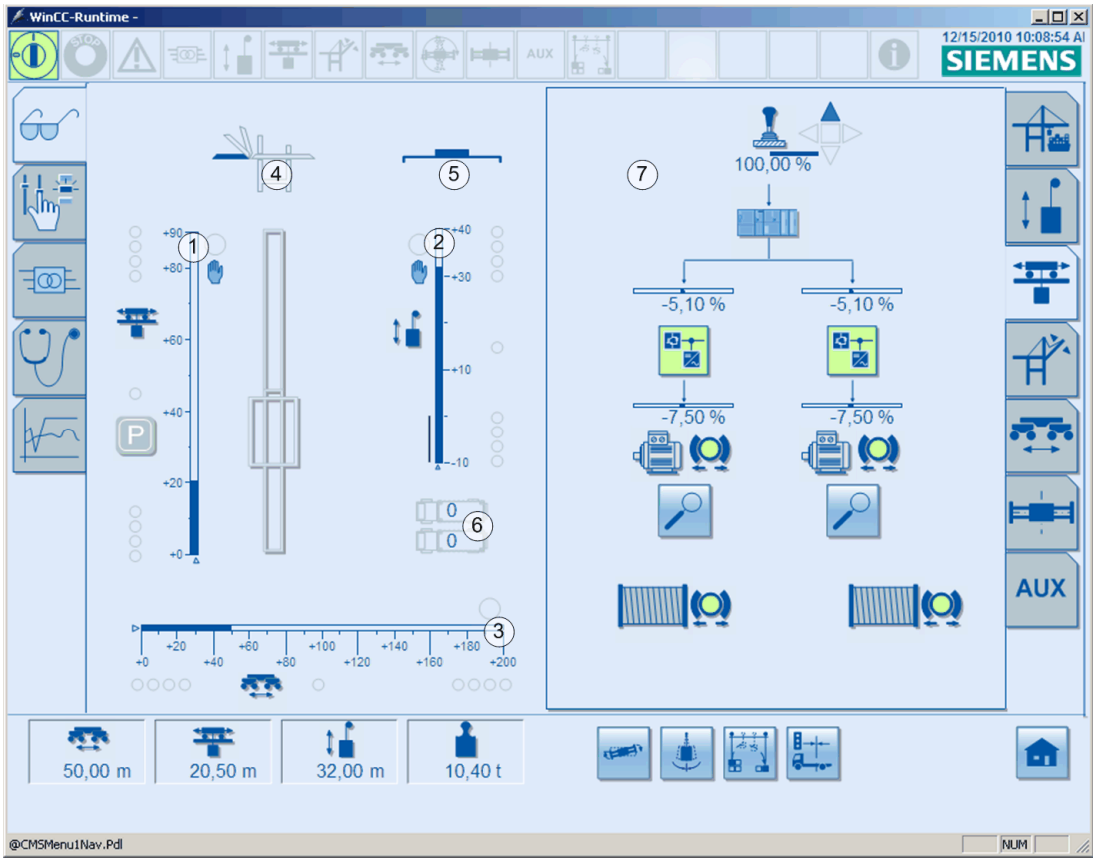
The display is prepared such that components and units are easy to recognize. The state of the elements is clearly shown by the colors used. Purely static screen objects are shown in gray, dynamic elements are blue in normal mode, yellow in a warning state and red in a fault state. It is crucial that the critical states can be recognized at a glance by the color alone.

The information displayed should be kept to a minimum. Precisely the information which the crane driver or service technician needs to reliably perform his work is normally displayed. If necessary, detailed information can be added.

Table 2- 2 Status display using a converter as example

Symbol	Symbol flashes	Description
	-	Converter inactive / off
		Converter ready to start
	-	Converter active / on
	-	Converter warning
	-	Converter fault

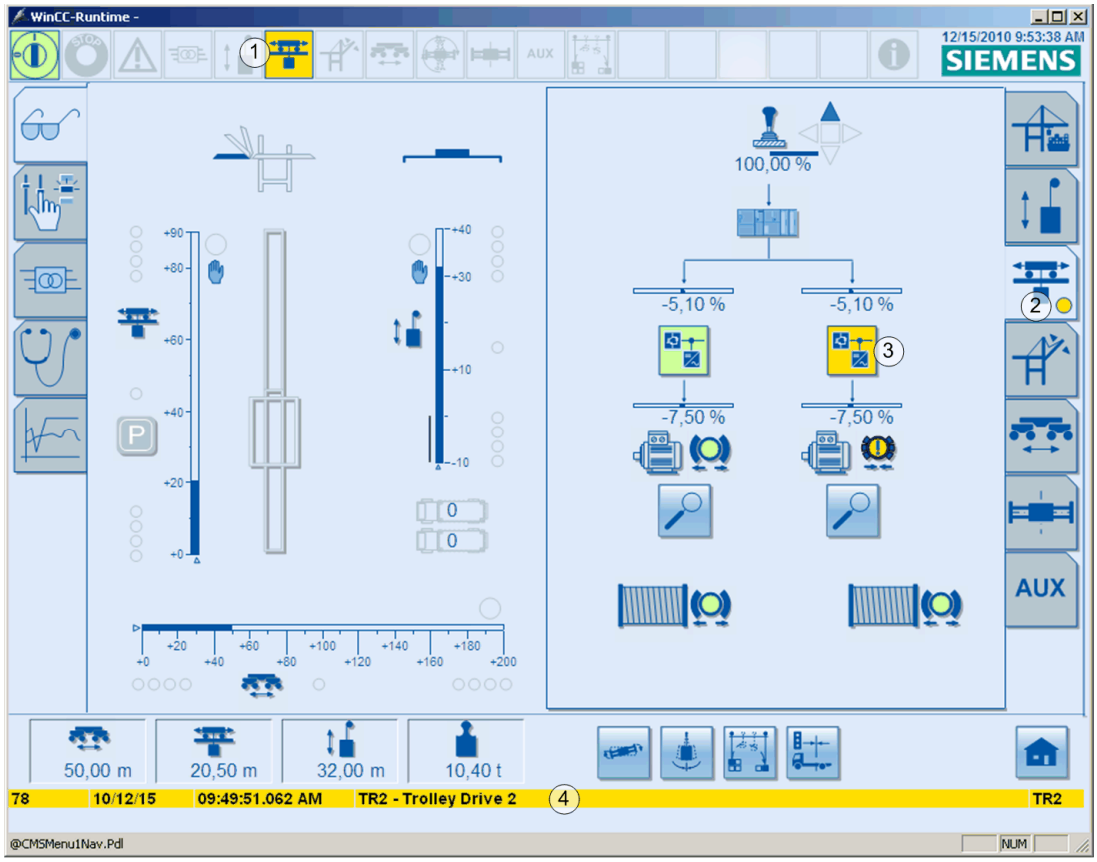
An overview display shows the crane overview with the crane's main movements. The following screen shows an example of an STS crane. The trolley movement is displayed from the view of the crane driver. Displaying the hoist position helps the crane driver by providing him with a view he wouldn't otherwise have.



① Movement of the trolley with limit switches, operating mode and park position display
② Movement of the hoist with limit switches and operating mode
③ Movement of the long travel with limit switches and operating mode
④ Position of the boom (bottom, top, 45° or none of the three positions)
⑤ Size and load of the spreader
⑥ Positioning of the vehicles and number of the lane (Truck Positioning System)
⑦ Detailed information about the individual components (here: trolley)

The CMS has a graphic fault display so that faults can be visually localized.

- The group fault display ① at the top edge of the screen shows the faulty component.
- In the secondary navigation bar ②, the button that is assigned to this component flashes.
- The cause of the fault ③ can be taken from the screen activated by pressing button ②.
- The cause of the fault ④ can be investigated in more detail using the associated text message ④.



2.5 Process control

In most cases, the CMS is simply used as a tool for displaying operating states. Control of a value on the crane controller by the CMS add-on is protected, which means that the operator has to have the appropriate rights and has to confirm this by acknowledging a security prompt.

In principle, CMS also offers the option of initiating operator actions by sending control commands to the crane controller (e.g. to switch-on auxiliary systems). Auxiliary systems can be switched on using special operator control buttons with integrated status display. In this case, each operator control button has several states:

Operation of the function disabled.

Function is not active.

Activation of the function is requested at the controller.

Function is active. Acknowledgment from the controller.

Another example is the option for presetting parameters and counter values.

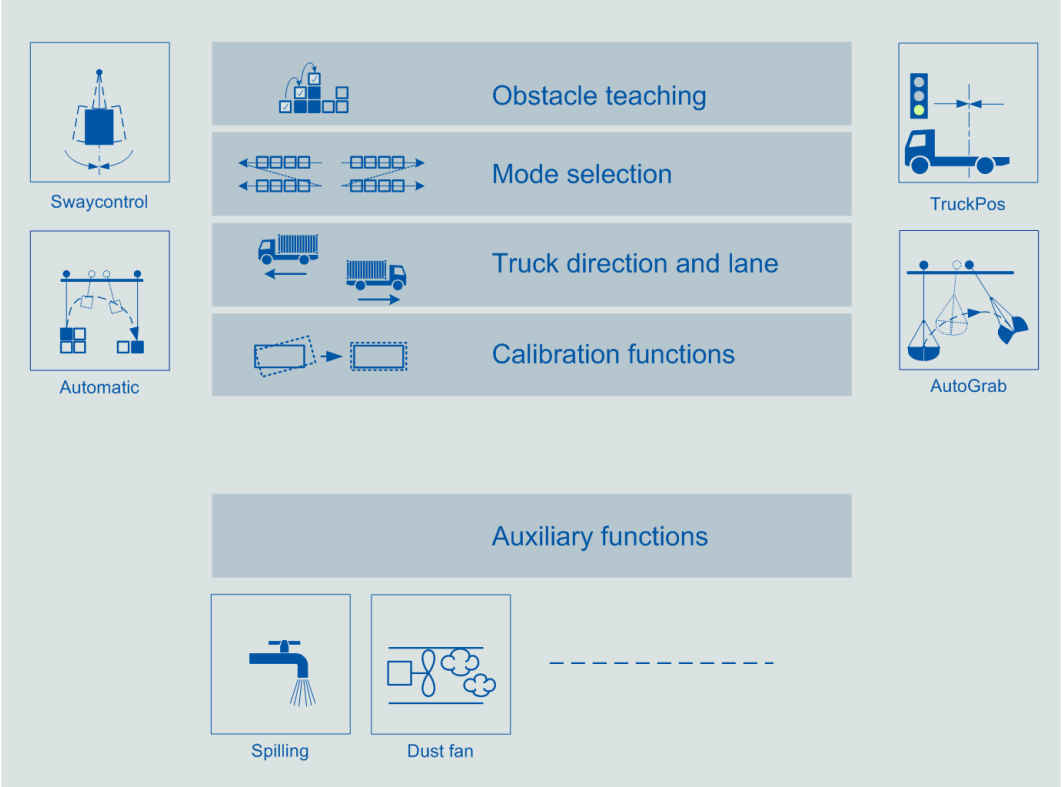


Figure 2-9 Overview of the process control

2.6 Fault diagnostics

The CMS acquires the fault messages from different components of the crane. The messages are archived, and can be displayed and evaluated using different resources:

- Message list in the user interface
- Report in the PDF and CSV format
- Message statistics (hit list)

In order to support maintenance technicians when analyzing faults, various items of information can be called for each message.

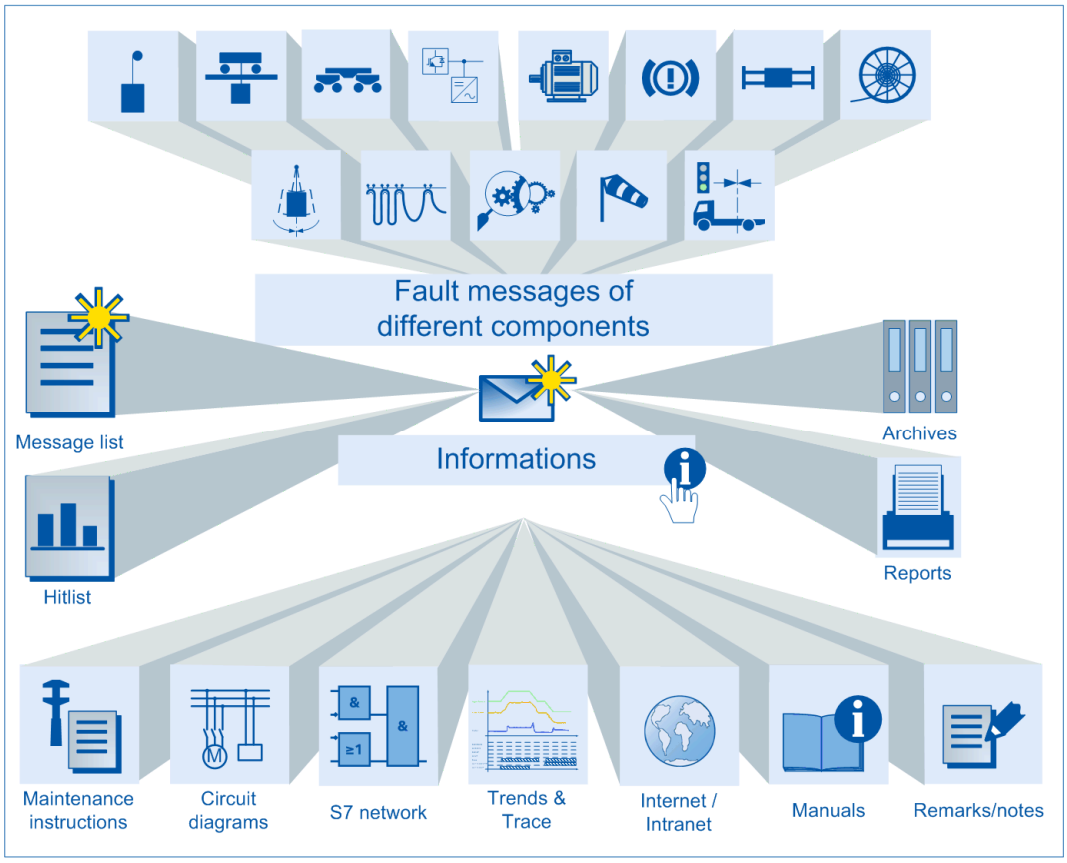


Figure 2-10 Overview of the fault diagnostics

2.6.1 Message lists

The current message list provides an overview of the crane's current queued messages. Each message is displayed as a separate message line. Various information about a message can be displayed in a message line. The following is displayed in the standard application:

- Message number
- Time stamp

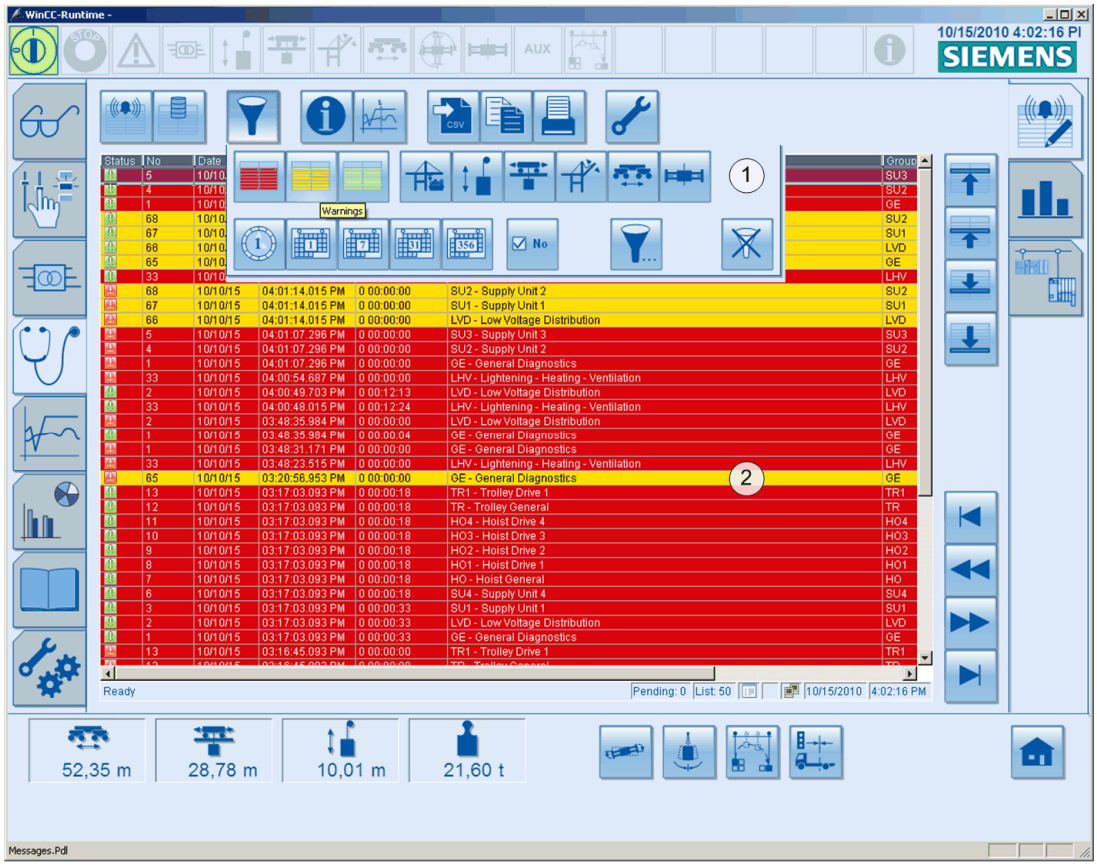
- Message text
- Group
- Plant ID (PID)
- Location ID (LID)
- Device ID (DID)

As soon as the cause of a message has been remedied, the corresponding message line disappears from the current message list.

The message history can be tracked in the archive list. One message line is displayed for an incoming message and one for an outgoing message. The message line is structured in the same way as the message list, but additional items are displayed here:

- Message status (incoming: +; outgoing: -)
- Length of message

The messages displayed in both the current message list and the archive list can be filtered using a predefined filter bar ①. In the CMS standard application, filtering according to different crane components, message number or according to alarm class (fault, warning, event) has been configured.



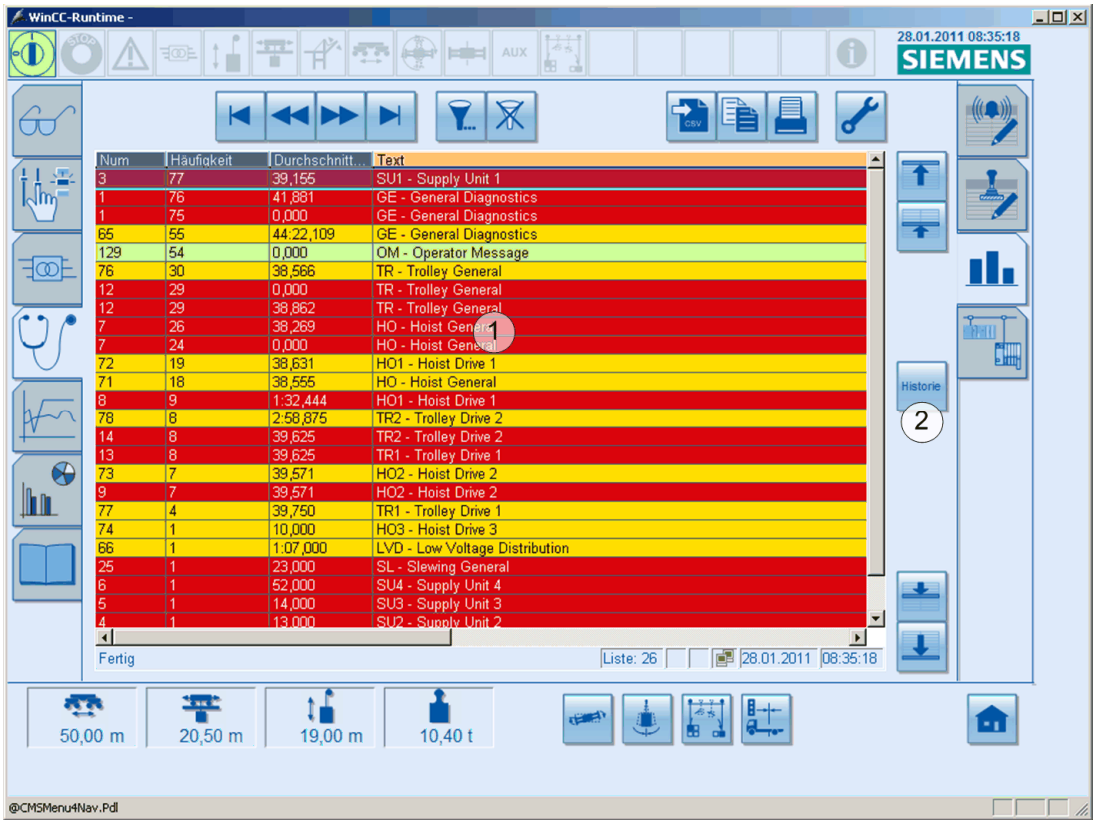
① Filter bar
② Message list (actual messages / archive)

Figure 2-11 Archive list of the messages

2.6.2 Message statistics

The message statistics evaluate the frequency and average message length for the messages which have occurred.

The hit list ① shows an overview of the message numbers, displayed in descending order by frequency. For every selected entry of the hit list, an overview of the messages in an archive list can be additionally displayed by pressing button ②.

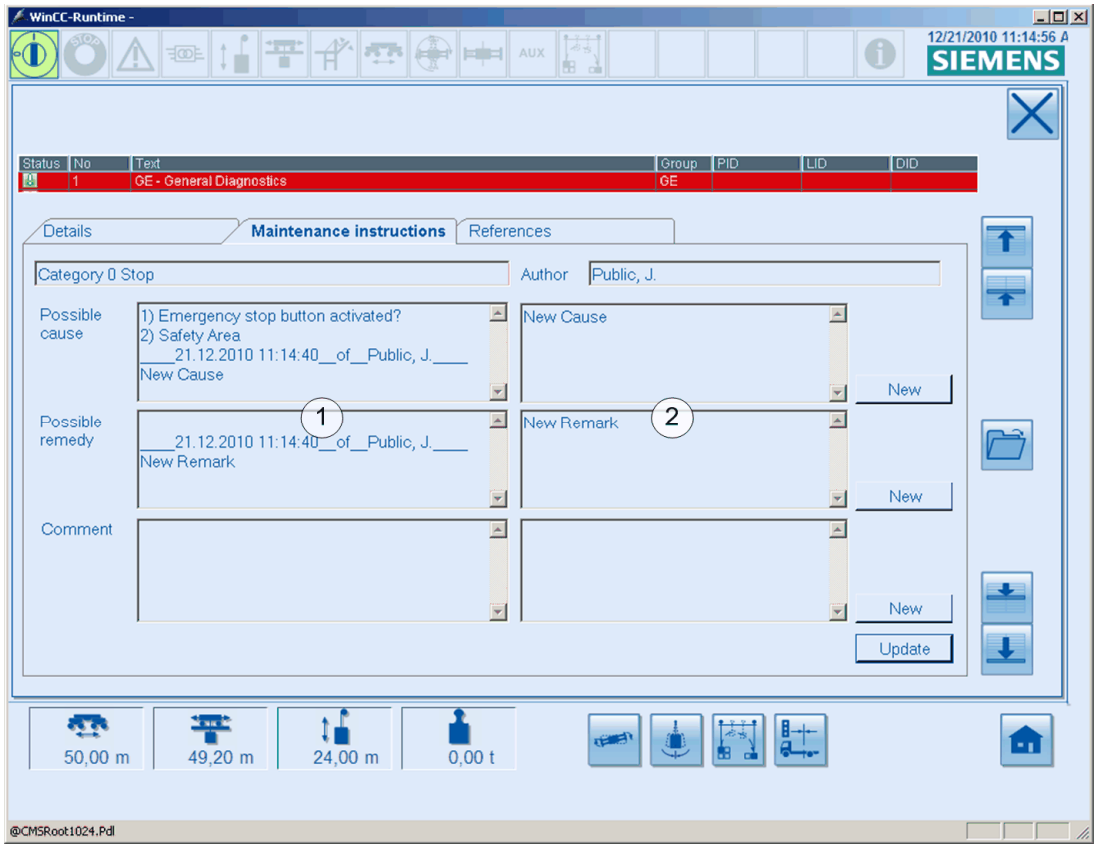

WinCC-Runtime -
28.01.2011 08:35:18
SIEMENS
Num | Häufigkeit | Durchschnitt... | Text
3 | 77 | 39,155 | SU1 - Supply Unit 1
1 | 76 | 41,881 | GE - General Diagnostics
1 | 75 | 0,000 | GE - General Diagnostics
65 | 55 | 44:22,109 | GE - General Diagnostics
129 | 54 | 0,000 | OM - Operator Message
76 | 30 | 38,566 | TR - Trolley General
12 | 29 | 0,000 | TR - Trolley General
12 | 29 | 38,862 | TR - Trolley General
7 | 26 | 38,269 | HO - Hoist General
7 | 24 | 0,000 | HO - Hoist General
72 | 19 | 38,631 | HO1 - Hoist Drive 1
71 | 18 | 38,555 | HO - Hoist General
8 | 9 | 1:32,444 | HO1 - Hoist Drive 1
78 | 8 | 2:58,875 | TR2 - Trolley Drive 2
14 | 8 | 39,625 | TR2 - Trolley Drive 2
13 | 8 | 39,625 | TR1 - Trolley Drive 1
73 | 7 | 39,571 | HO2 - Hoist Drive 2
9 | 7 | 39,571 | HO2 - Hoist Drive 2
77 | 4 | 39,750 | TR1 - Trolley Drive 1
74 | 1 | 10,000 | HO3 - Hoist Drive 3
66 | 1 | 1:07,000 | LVD - Low Voltage Distribution
25 | 1 | 23,000 | SL - Slewing General
6 | 1 | 52,000 | SU4 - Supply Unit 4
5 | 1 | 14,000 | SU3 - Supply Unit 3
4 | 1 | 13,000 | SU2 - Supply Unit 2
Fertig
Liste: 26
28.01.2011
08:35:18
Historie
1
2
50,00 m
20,50 m
19,00 m
10,40 t
@CMSMenu4Nav.Pdl

①	Hit list	Message statistics
②	Button	Opens an archive list

2.6.3 Maintenance instructions and guidelines

You can save maintenance instructions for every message in the CMS. These can then be displayed when the selected message appears. Maintenance instructions can include any information about causes and instructions on how to resolve the fault.

As well as calling up information that has been saved, you can also add inputs to a maintenance instruction during operation, which can also be used by other users in the future.



①	Maintenance instructions	Shows saved maintenance instructions for the message selected
②	Remarks	Input of remarks about maintenance instructions

2.6.4 References to additional information

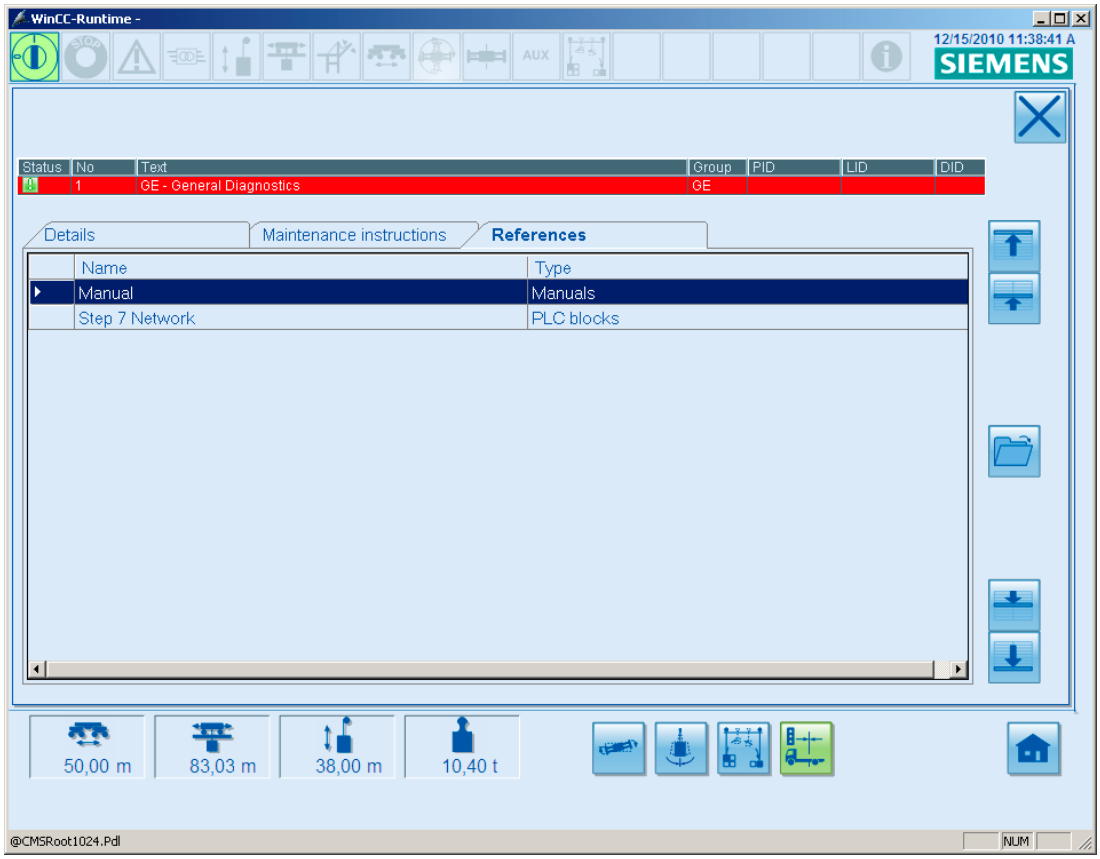
As with the maintenance instructions, you can save references for any message

- Circuit diagrams
- Symbols and networks in the crane controller's control program
- Programming Manuals
- Web pages
- Drawings

The references that are displayed depend on the programs installed on the PC. The reference is not opened in the CMS itself, but in a program installed on the PC.

The references available must be in a local path on the CMS station or in a network path which can be accessed from various stations.

As with the maintenance instructions, the list of references available for a message is shown together with an archive list.



2.6.5 Web-based diagnostics of components

If crane components or subsystems have web-based diagnostics pages, these can be activated directly in the CMS.

Applications for this diagnostic functionality include:

- SIMOTION IT diagnostics
- Components of the SIMATIC family (CPUs with integrated PROFINET interface, Industrial Ethernet Switches)
- SIMATIC PCs; one of the accessories provided with the DiagMonitor package is a web server which offers diagnostics for your PC.
- Spreaders from well-known manufacturers

The web-based diagnostics pages can be integrated in the CMS user interface. For this, the following preconditions must be fulfilled:

- The component involved can be accessed via its IP address.
- The relevant diagnostic pages are enabled on the target device.

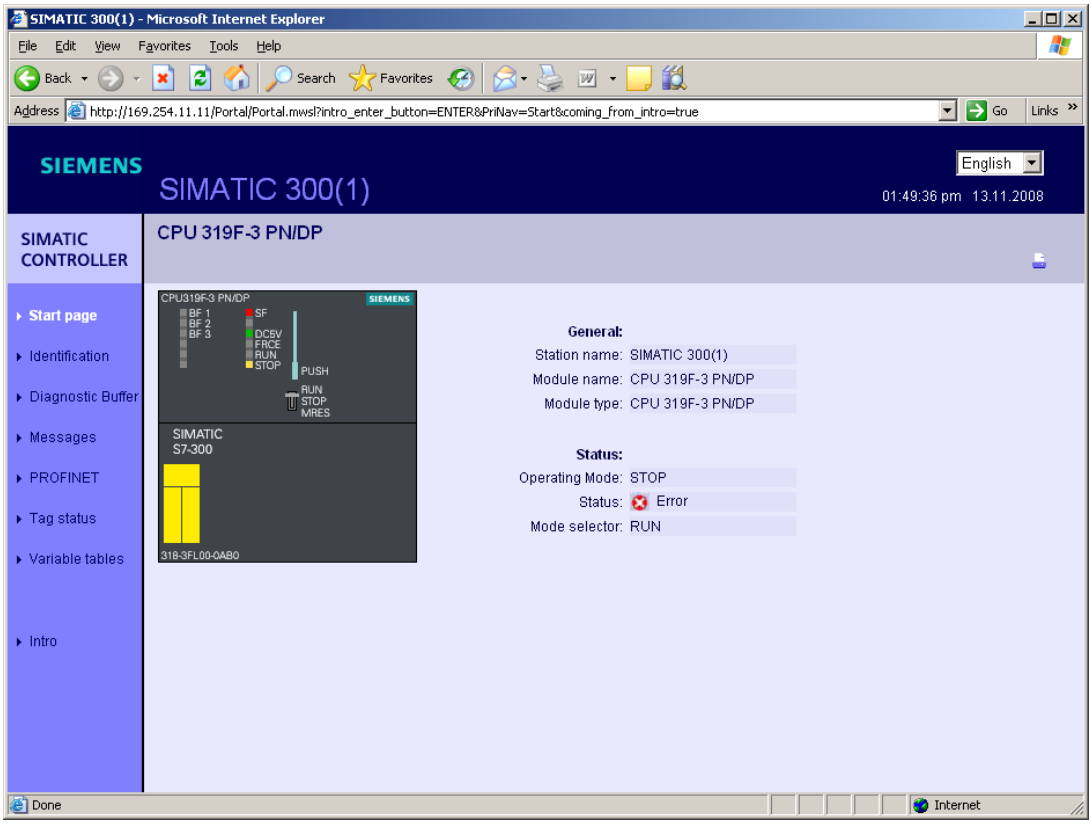


Figure 2-12 Web-based diagnostics page of a SIMATIC S7-300 CPU

2.7 Operational data

2.7.1 Recording operational data

The operational data that can be acquired with the CMS include:

- Cargo handling data; set of relevant data for a cargo handling operation
- Mean Moves Between Failure (MMBF); the so-called MMBF value reflects the average amount of cargo handling between two faults of relevance to MMBF (cargo handling / fault). The mean value relates to a fixed time range. A fault of relevance to MMBF is a fault which cannot be rectified by a crane driver, but which causes a crane to stop operating.
- Load and operating hours counter values

2.7.2 Cargo handling data

You can acquire a set of relevant operational data for each cargo handling operation ("Move") in the CMS. A cargo handling data set includes for example:

- Weight
- Transport direction
- Operating mode
- Positions
- specific data (e.g. container sizes for container cranes)

A default data set for recording cargo handling data is initialized in the CMS standard application. This default data set can be expanded in any way.

Data is collected on the controller. The CMS supports two different recording modes:

- Direct recording of data:
  As soon as the end of one cargo handling process has been detected on the controller, the event is reported to the CMS which reads the data set and sets the time stamp.
- Data recording with backup:
  The controller is initialized for backing up data sets. In this case the time stamp must be set on the controller and transferred to the CMS with the data set.

The cargo handling data is displayed in tables in the CMS standard application. You can filter the way the data sets are displayed by different time slices.

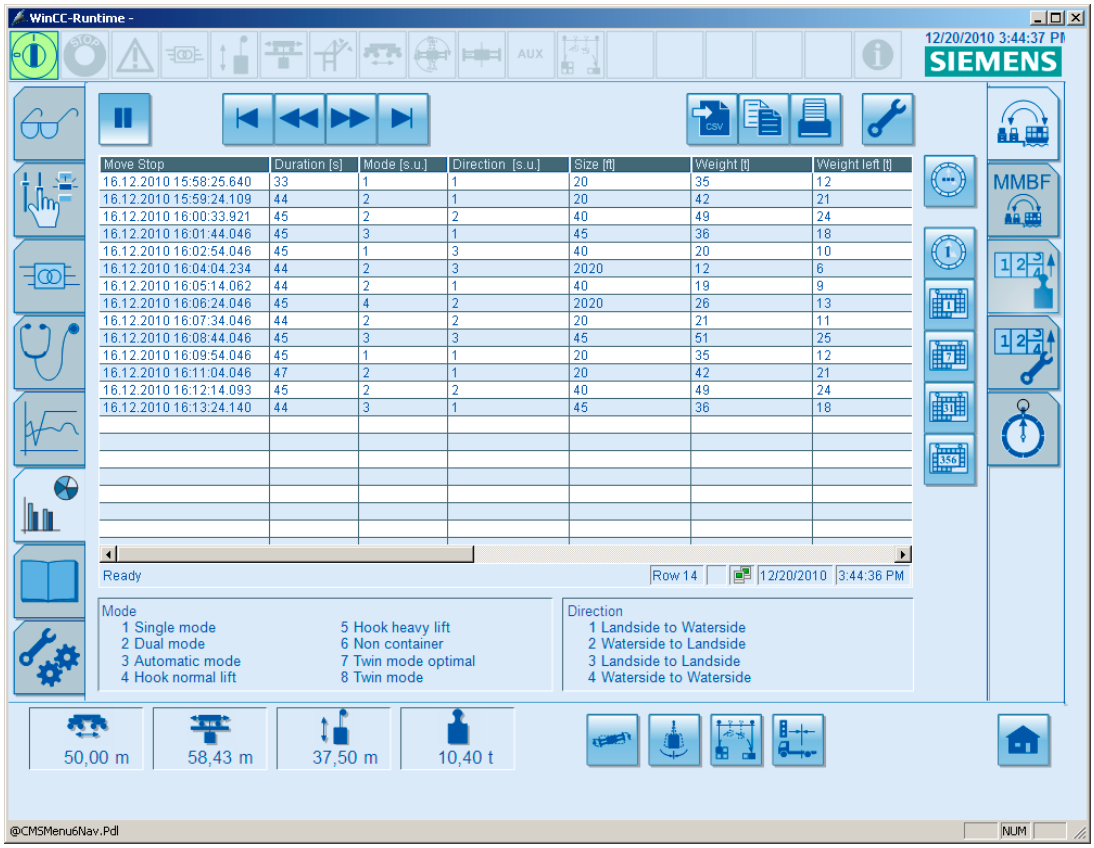


Figure 2-13 Tabular list of the cargo handling operations that have been recorded

2.7.3 Load and operating hours counter

You can record current counter values on the controller. Time slices can be defined in the CMS. The CMS calculates the counters' differential values for these time slices. The CMS supports automatic counter restoration when the controller is reloaded. Total and section counters can also be used for each counter. You can visualize the total counter and total kilometer reading for your car, as well as the section counter and trip recorder. As with your car's trip recorder, a reset button can be used to reset the crane's section counter.

You can display the absolute values of the counter values in the CMS user interface. Operating hours are displayed in the CMS standard application in hours and minutes. The absolute value corresponds to the process value on the controller. You can use the RESET buttons to reset the section counters.

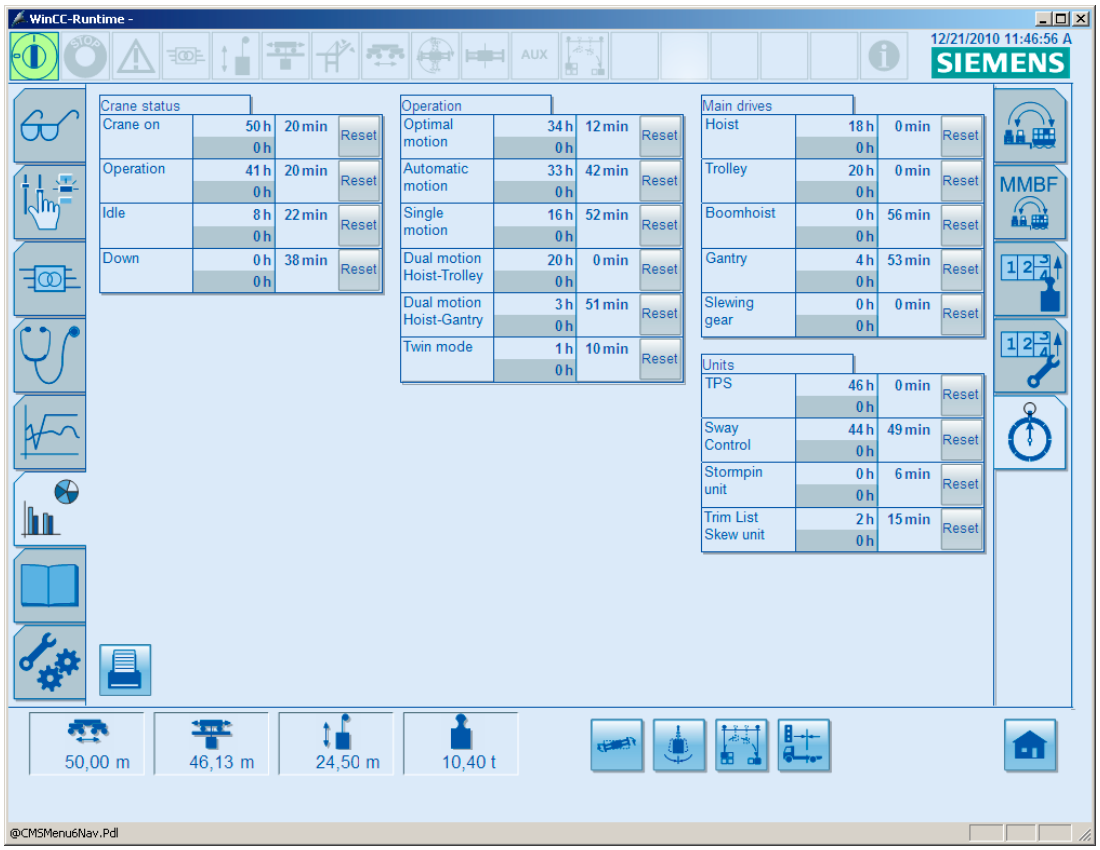

WinCC-Runtime -
12/21/2010 11:46:56 A
SIEMENS
Crane status
Crane on 50 h 0 h 20 min Reset
Operation 41 h 0 h 20 min Reset
Idle 8 h 0 h 22 min Reset
Down 0 h 0 h 38 min Reset
Operation
Optimal motion 34 h 0 h 12 min Reset
Automatic motion 33 h 0 h 42 min Reset
Single motion 16 h 0 h 52 min Reset
Dual motion Hoist-Trolley 20 h 0 h 0 min Reset
Dual motion Hoist-Gantry 3 h 0 h 51 min Reset
Twin mode 1 h 0 h 10 min Reset
Main drives
Hoist 18 h 0 h 0 min Reset
Trolley 20 h 0 h 0 min Reset
Boomhoist 0 h 0 h 56 min Reset
Gantry 4 h 0 h 53 min Reset
Slewing gear 0 h 0 h 0 min Reset
Units
TPS 46 h 0 h 0 min Reset
Sway Control 44 h 0 h 49 min Reset
Stormpin unit 0 h 0 h 6 min Reset
Trim List Skew unit 2 h 0 h 15 min Reset
MMBF
50,00 m
46,13 m
24,50 m
10,40 t
@CMSMenu6Nav.Pdl

Figure 2-14 Operating hours display

2.8 Reporting

2.8.1 WinCC report system

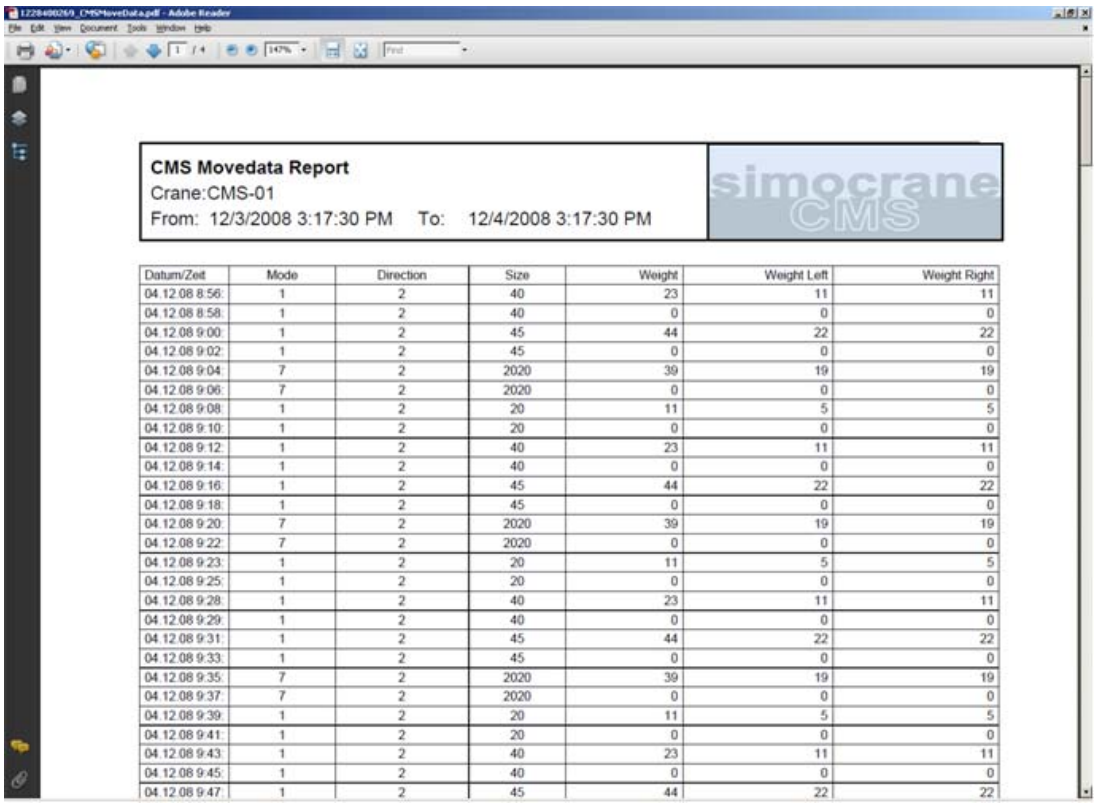
The WinCC protocol system (Report Designer) can be used to prepare data recorded during the runtime in various output formats. The reports can be printed, saved as a file and displayed as a preview on the screen.

The reports are based on configurable templates in which data can be brought together in precise accordance with requirements. Protocols are therefore available for current or archived messages or the operational data displayed.

The standard application contains the following reports:

- the current message list
- the alarm log
- the cargo handling data
- the MMBF data
- the current counter values

All standard reports are based on a tabulated presentation of the default data in the CMS standard application. Note that you have to adapt the data to your project as soon as you have changed requirements.



CMS Movedata Report
Crane:CMS-01
From: 12/3/2008 3:17:30 PM To: 12/4/2008 3:17:30 PM

Datum/Zeit	Mode	Direction	Size	Weight	Weight Left	Weight Right
04.12.08 8:56:	1	2	40	23	11	11
04.12.08 8:58:	1	2	40	0	0	0
04.12.08 9:00:	1	2	45	44	22	22
04.12.08 9:02:	1	2	45	0	0	0
04.12.08 9:04:	7	2	2020	39	19	19
04.12.08 9:06:	7	2	2020	0	0	0
04.12.08 9:08:	1	2	20	11	5	5
04.12.08 9:10:	1	2	20	0	0	0
04.12.08 9:12:	1	2	40	23	11	11
04.12.08 9:14:	1	2	40	0	0	0
04.12.08 9:16:	1	2	45	44	22	22
04.12.08 9:18:	1	2	45	0	0	0
04.12.08 9:20:	7	2	2020	39	19	19
04.12.08 9:22:	7	2	2020	0	0	0
04.12.08 9:23:	1	2	20	11	5	5
04.12.08 9:25:	1	2	20	0	0	0
04.12.08 9:28:	1	2	40	23	11	11
04.12.08 9:29:	1	2	40	0	0	0
04.12.08 9:31:	1	2	45	44	22	22
04.12.08 9:33:	1	2	45	0	0	0
04.12.08 9:35:	7	2	2020	39	19	19
04.12.08 9:37:	7	2	2020	0	0	0
04.12.08 9:39:	1	2	20	11	5	5
04.12.08 9:41:	1	2	20	0	0	0
04.12.08 9:43:	1	2	40	23	11	11
04.12.08 9:45:	1	2	40	0	0	0
04.12.08 9:47:	1	2	45	44	22	22

Figure 2-15 Form of display for standard reports

In the CMS standard application, the standard reports are configured in such a way that they are always printed using the PC's standard printer. You can define the standard printer in your PC's system control panel.

2.8.2 WinCC/Data Monitor for the CMS station

While the standard WinCC protocol system prepares the current process status and historical data and messages in standard formats, the Data Monitor option offers further scope for analysis and graphic preparation of data. It makes sense to use the Data Monitor on the local CMS station if there is no central RCMS server that can be used for data analysis.

The Data Monitor can output data in MS Excel or PDF format. The MS Excel tools for further data editing are therefore available.

The Data Monitor "WebCenter" can be used to produce what are known as "WebCenter pages" on the local CMS station. Various pieces of information can be provided on these pages. The WebCenter pages can be accessed via Internet Explorer and also displayed and edited directly in the CMS. The CMS must simply be able to access the WebCenter pages.

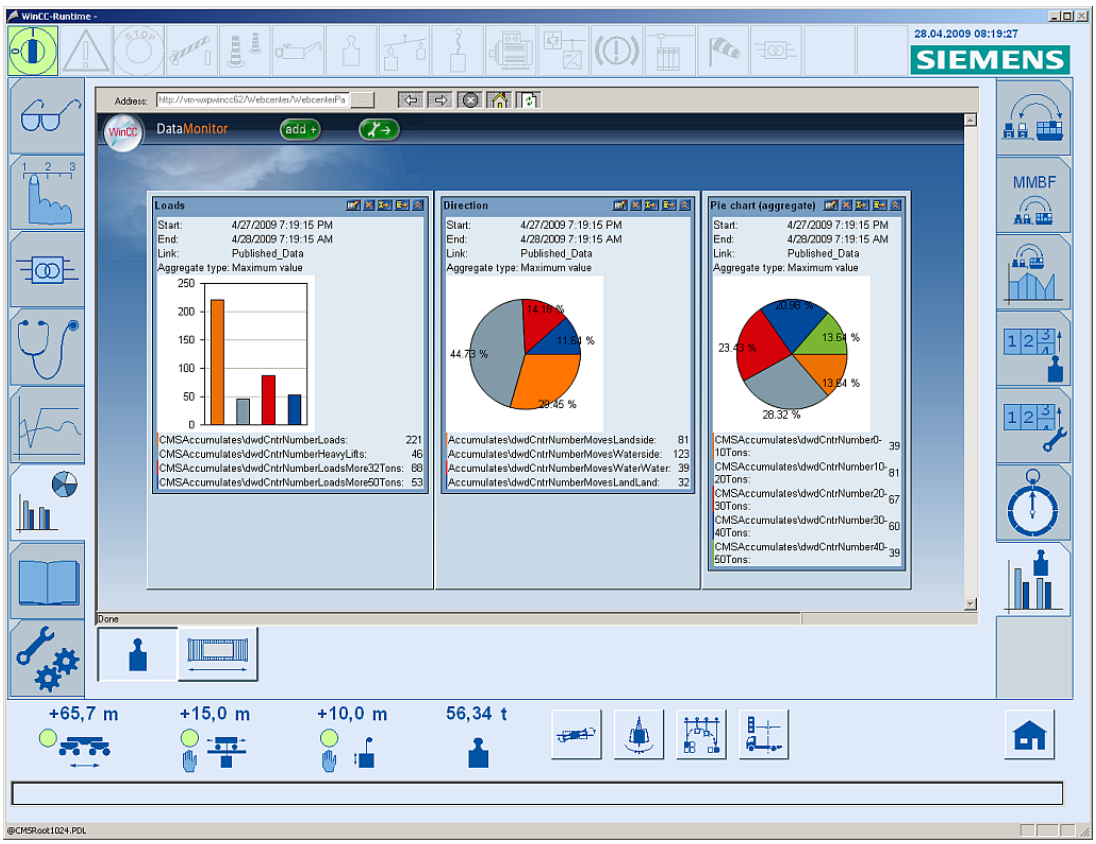


Figure 2-16 Display and analysis of operational data with the WinCC DataMonitor WebCenter

All data is displayed using standard tools such as MS Excel and MS Internet Explorer. You can prepare reports individually put together online using event or time control and also distribute them for analysis via the Intranet/Internet. The reports generated which can be accessed from the Intranet/Internet can however also be called up directly in the CMS user interface.

The user administration can be used to limit and monitor the display and editing of information.

2.8.3 Output formats and interfaces

Depending on the version, the CMS offers different data interfaces with different output formats:

- The CMS WinCC add-on provides operational data (cargo handling data, MMBF data, counter values) in XML format.
- The WinCC controls for displaying archive values such as messages, move data and MMBF data support export to CSV format.
- The Trace Viewer control for displaying trace data supports export to CSV format.
- You can use the Data Monitor option to export data archived in WinCC in MS Excel or PDF format.

2.9 Recording process values

2.9.1 Applications

The recording of process values mainly covers two applications:

- Fault analysis when the crane is at a standstill: During the fault analysis, first the trend of various process values should be shown as a fault message. The process values in one time range are shown in relation to the time stamp of the fault message with pre- and posttrigger time period.
- Recording and analysis of continual process values when commissioning the crane

Another criterion for the display accuracy and the quality of the fault analysis is the resolution of the measurement points. The higher the resolution, the more measurement points and the higher the volume of data.

2.9.2 WinCC standard process value archiving

With WinCC Tag Logging, values with maximum 500 ms can be recorded and archived. These values are displayed in the CMS standard application as continuous trends.

Advantage:

The advantage of WinCC standard process value archiving is that it can be quickly and cheaply implemented.

Disadvantage:

However the disadvantage is the low resolution of the trends. since an archiving cycle of 500 ms generates an insufficient number of measurement points for the post mortem analysis.

2.9.3 WinCC standard process value archiving with increased resolution

For the following applications, data can be prepared on the controller, collected and sent to WinCC in one telegram:

- Process values with an interval of less than 500 ms are recorded
- Values are acquired with a time stamp from the controller
- Several values can be acquired in time synchronism

The data are entered into a WinCC Tag Logging archive with the time stamp allocated by the controller.

For detailed information, for instance on the telegram structure, refer to the WinCC documentation (WinCC communication manual → SIMATIC S7 PROTOCOL SUITE channel → Special functions).

For SIMATIC S7, there are blocks that can be parameterized for sending a telegram. In the S7-400 automation system, there is the integrated function block SFB 37 "AR_SEND" .

Advantage:

The advantage of this method is that archiving cycles of less than 500 ms are possible in WinCC. High levels of configuration effort are not needed on the HMI side.

Disadvantage:

The high level of configuration effort impacts negatively on the controller side. In particular there is a high level of communication between the automation system and WinCC. When several process values are being transferred, the cycle time and transfer rate of the communications interface must be noted.

2.9.4 CMS Fast-Trace – SIPLUS CMS

SIPLUS CMS is a high-performance condition monitoring product for recording high-speed trace data.

The hardware for the SIPLUS CMS comprises what are known as URNs (User Nodes) and so-called IONs (Input Output Nodes). The URNs are components for administering, saving and visualizing the data recorded. The X-Tools software included in the scope of delivery is needed for this. The IONs are used to record data and forward it to X-Tools.

The following IONs can be used:

- Software IONs

  SIPLUS CMS records the data directly from the SIMATIC S7 and SIMOTION controllers using appropriate software IONs (Input-Output Nodes).

- Hardware IONs

  The SIPLUS CMS product range includes a series of hardware IONs which can be used to directly record measured values. The huge benefit of this option is that measured variables can be recorded precisely where they occur. This avoids incorrect interpretations which may result from the time taken to transmit via a controller.

- PROFIBUS ION

  The PROFIBUS ION, also known as "Spy", is particularly versatile. This module can be used to record any values which pass via the PROFIBUS. The spy is a totally passive node and affects neither the bus nor the cycle time of controllers.

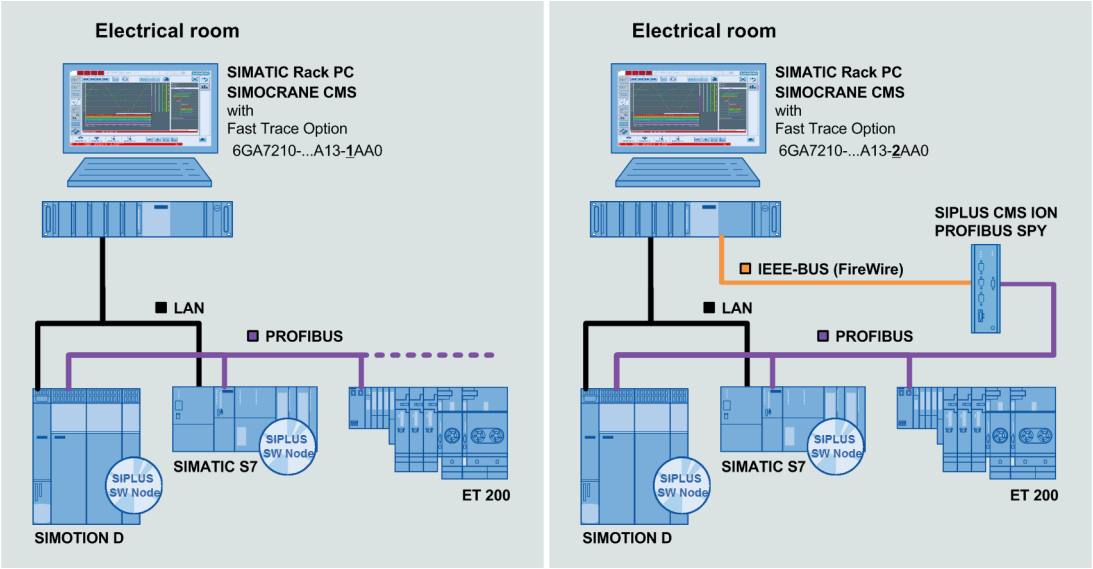


Figure 2-17 SIPLUS CMS configuration

The "X-Tools" software tool is used for configuration and evaluation. Data can be analyzed in real-time (online data) as well as archived for subsequent analysis (offline data). Saving data is configured using what are known as "Storage Profiles".

SIMOCRANE CMS provides a "Trace-Viewer" for conveniently displaying saved offline data, embedded in the CMS user interface. Starting from an error message, you can easily select and display the saved trace data.

Figure 2-18 CMS Fast Trace in the CMS user interface

The user can configure and display different referring to a message. The individual configurations can be saved as "sets" and can also be displayed later.

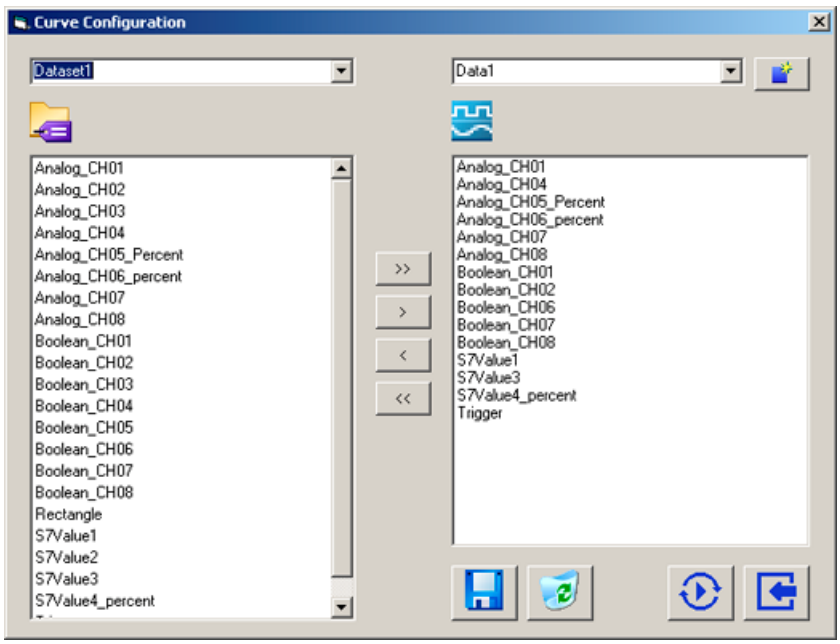


Figure 2-19 Configuring a set of available trace data in the WinCC control of the Trace Viewer

Remote CMS (RCMS)

3

Larger plants usually have a control room with one or more operator stations, used to monitor the entire plant. The data from all subordinate local CMS stations is collected, displayed and evaluated here.

Remote access to CMS stations is also possible. In the crane environment, this is therefore known as "Remote CMS" (RCMS). In fault scenarios, diagnostic information can therefore be called up in advance. In the best case scenario, a fault can be resolved in this way.

This chapter provides an overview of the system design and main functions which the remote CMS (RCMS) provides for monitoring the entire plant and remote access to CMS stations.

In addition to the possibility of pure remote access to the CMS stations of the cranes via WinCC Web Navigator, RCMS can be implemented as data server with its own operator station and additional remote access to the cranes. The focus here is on the complete system, not on a single crane. Cranes of the same type can be compared in order to locate weak points. Determining what are known as KPIs (Key Performance Indicators) and overviews of operation modes, downtimes etc. play a key role at this point.

- Overall plant overview (cartographic)
- Status display for several cranes
- Status display for the stacking area
- Data analysis across all connected crane systems
- Availability overview
- Higher-level performance analyses
- Long-term archiving

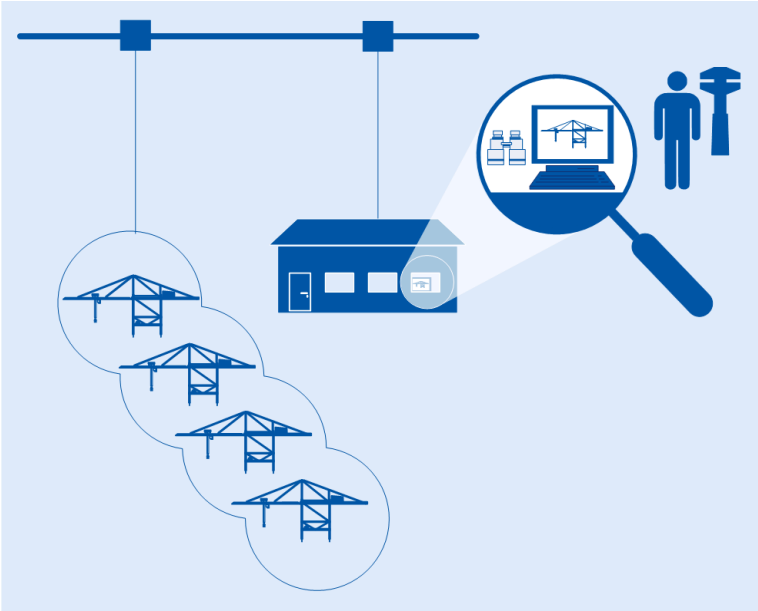


Figure 3-1 Remote access to several cranes

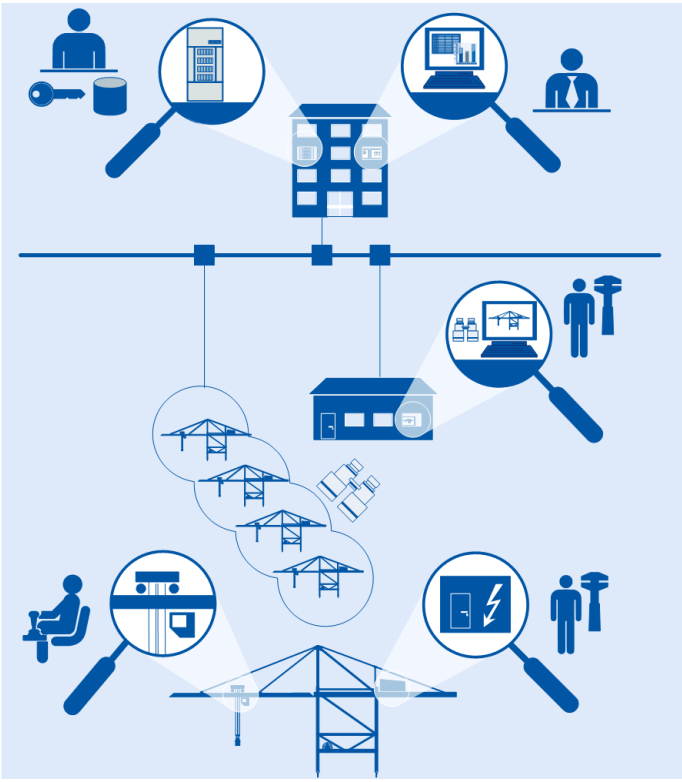


Figure 3-2 RCMS server (central or remote CMS)

3.1 RCMS topology

You always require the WinCC Web Navigator Server on the CMS stations in order to remotely access the cranes. This allows you to see the CMS user interface on the remote PC.

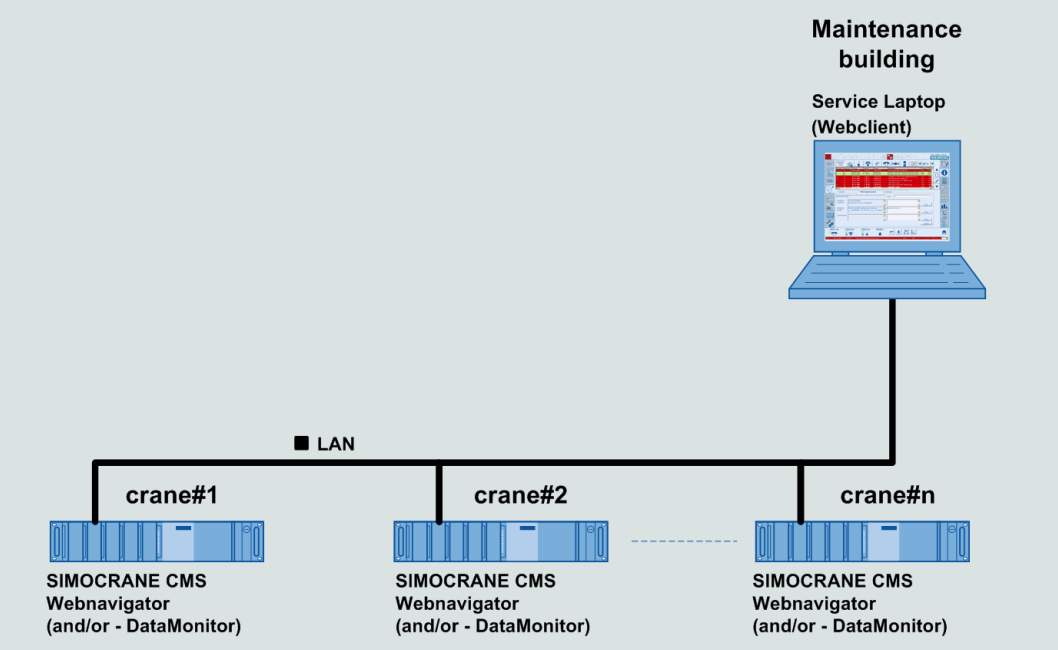


Figure 3-3 RCMS topology remote access

The RCMS server archives operational data and messages from all connected cranes (CMS), provides different evaluation and display options, and offers remote access to the CMS stations of the individual cranes.

Depending on the particular requirement, the RCMS can be configured differently:

- RCMS server without additional operator stations (RCMS server - single)
- RCMS server with one or several central operator stations (RCMS server - client)

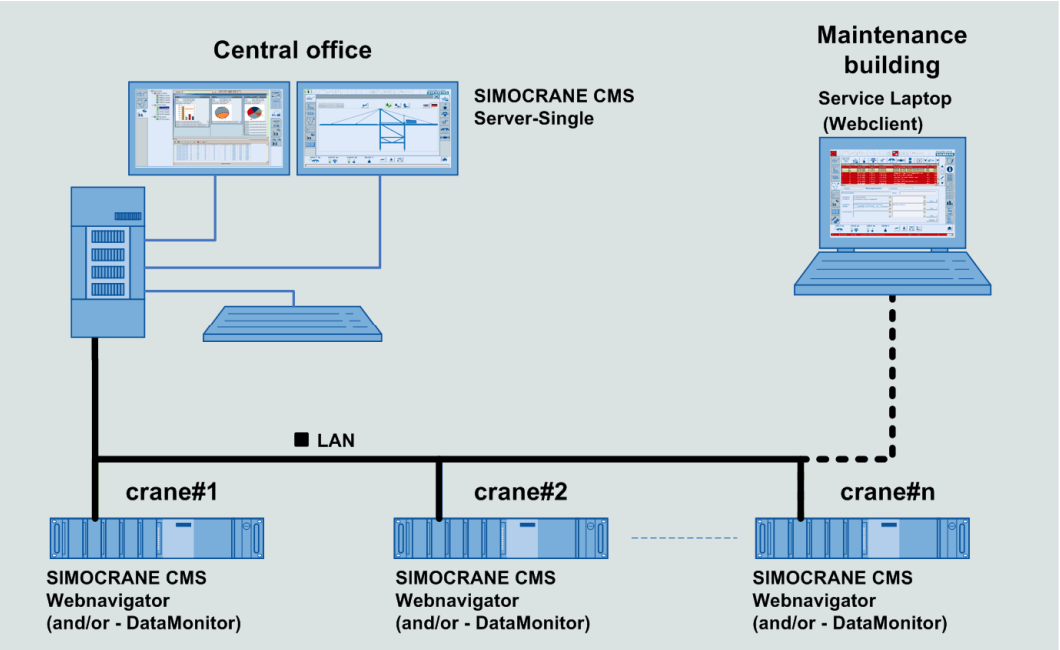


Figure 3-4 RCMS server without additional operator stations

3.2 CMS-RCMS data transfer

The WinCC add-on SIMOCRANE CMS is responsible for data transfer between the CMS and the RCMS server.

The data transfer is performed via TCP/IP and includes:

- The transfer of configuration data (support for configuration)
- Transferring runtime data from the CMS station to the RCMS server:
  - WinCC messages
  - Operational data
  - Tag values

For the configuration data transfer, configuration data of the CMS stations from the WinCC and CMS editors are generated on the RCMS server and in some cases synchronized between cranes of the same equipment type.

There is an XML interface on the CMS station for runtime data, type "Messages" or "Operational data". XML files are created in parallel to the archiving. These files are then transferred to the RCMS server and also archived there.

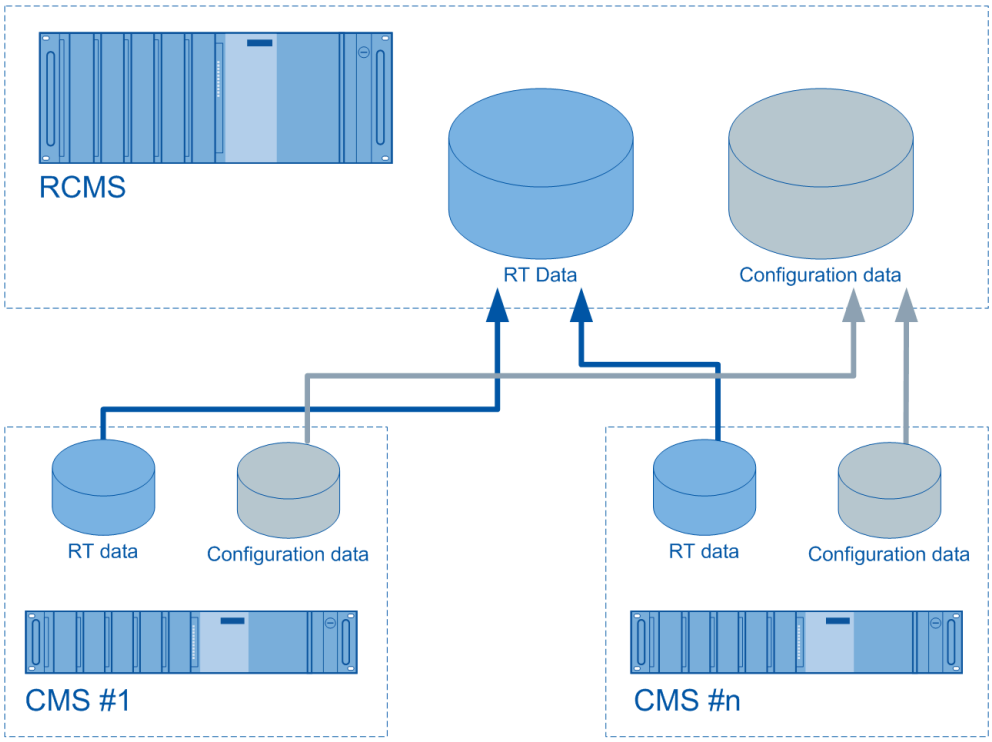


Figure 3-5 CMS – RCMS data synchronization

3.3 Design of user interface

One or more RCMS operator stations are integrated into a topology, depending on the circumstances involved. However, from a functionality perspective, the RCMS operator stations are identical.

An RCMS operator station is a central operator station used to display archived and evaluated data. It also supports visualization of the entire plant and remote access to the CMS stations. The RCMS standard application supplied provides an example of how the terminal overview, message lists of all connected cranes, and the analysis of operational data and performance across all cranes can be displayed.

You can use the Web Navigator remote access function to view the CMS station's screens directly from the RCMS operator station.

The diagram below shows an example of how an RCMS operator station with two screens is structured. The terminal overview can therefore be displayed on the first screen and at the same time the CMS screens via Web Navigator on the second screen.

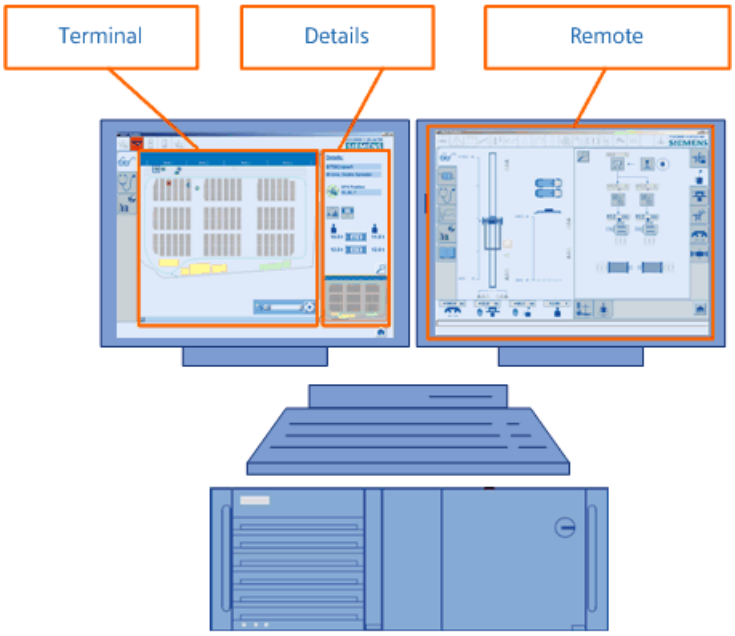


Figure 3-6 RCMS operator station with two screens

The screen frame of the RCMS operator station is similar to the CMS station.

The RCMS application has three menus:

- Status display with the terminal overview focus
- Fault diagnostics
- Analysis

3.4 Terminal overview

3.4.1 Cartographic display

The RCMS application contains a cartographic overview and also displays the terminal as a tree structure.

Once in the cartographic overview, you can move around the map of the terminal. To do this, you are provided with simple navigation tools to allow you to move up/down the screen and move to the left/right. There is also a zoom function and a smaller overall view with section positioning.

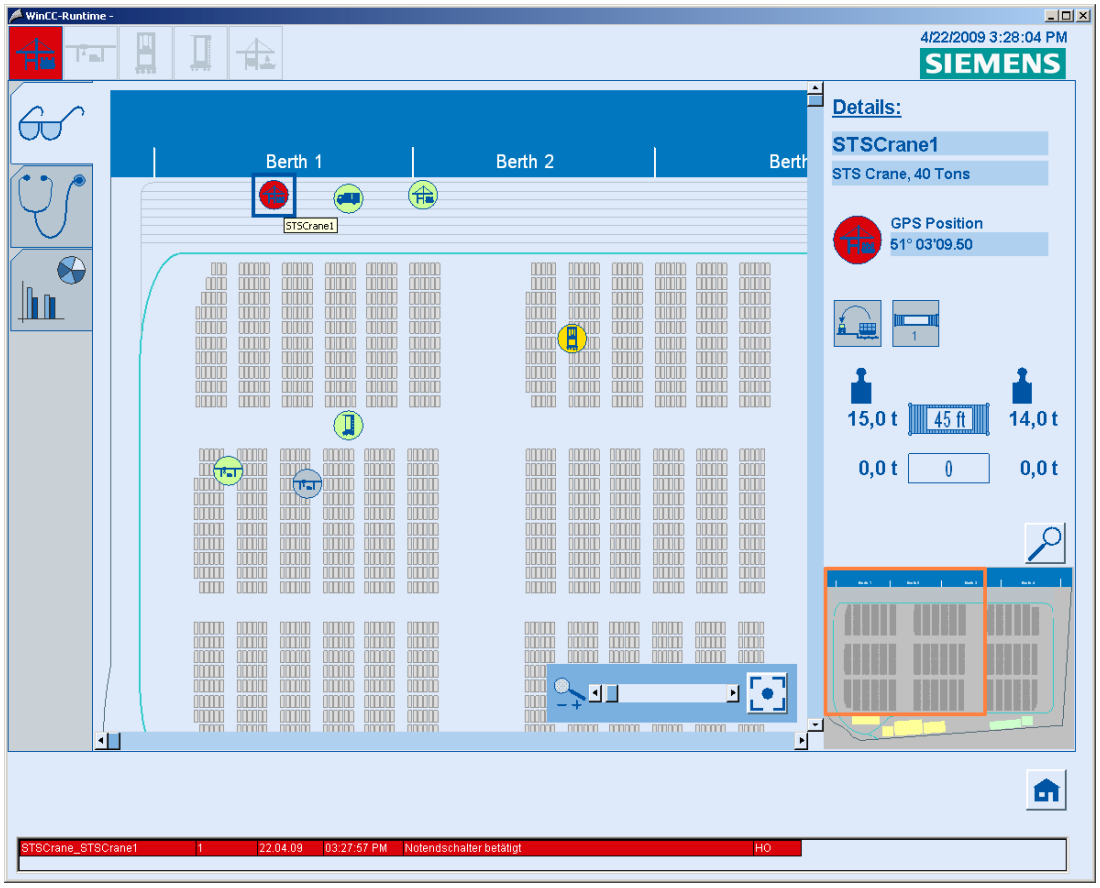


Figure 3-7 Total plant view (cartographic)

The cartographic representation enables you to display the individual berths, the stacking areas, routes as well as relevant terminal buildings. If the cranes, trucks or straddle carriers are equipped with a GPS receiver, their position within the terminals can be visualized using a symbol in the screen. In addition, the symbol color indicates the operating state. In the RCMS application, this display is realized for some sample cranes. In the following, an STS crane:

OK / in operation

Idle

Warning present

Fault present

No connection to the crane

WinCC / CMS Runtime stopped

No connection to the controller

Undefined status

If you position your mouse on a component in the overview of the RCMS application, then the name of the component is displayed as tooltip text. Click the component to call up the available detailed information (description, position, operating mode, load, etc.) in the detailed view on the right-hand side. The magnifying glass allows you to call up the screens of the crane's CMS station via remote access; see Remote access (Page 60).

3.4.2 Tree view and statistics

In addition to the cartographic display, the RCMS application also features a tree structure showing all of the cranes that are available. The tree display is a WinCC control from the CMS WinCC add-on (CMS Node Tree Control). The tree topology is defined in the CMS editor.

Within the tree, cranes are assigned to a terminal and an equipment type (e.g. STSCrane). You can also follow the operating states of the various cranes here as they change color (see above). The tree view allows you to select individual cranes and call up the following information:

- Total number of all cranes for a terminal or cranes for the selected equipment type (e.g. "STSCrane").
- Number of offline components for the selected equipment type
- Number of standby components for the selected equipment type
- Number of components in operation for the selected equipment type
- Number of components with a warning pending for the selected equipment type
- Number of faulty components for the selected equipment type

The start page shows the tree view alongside current statistics for the terminal. The statistics are based on information from the tree view.

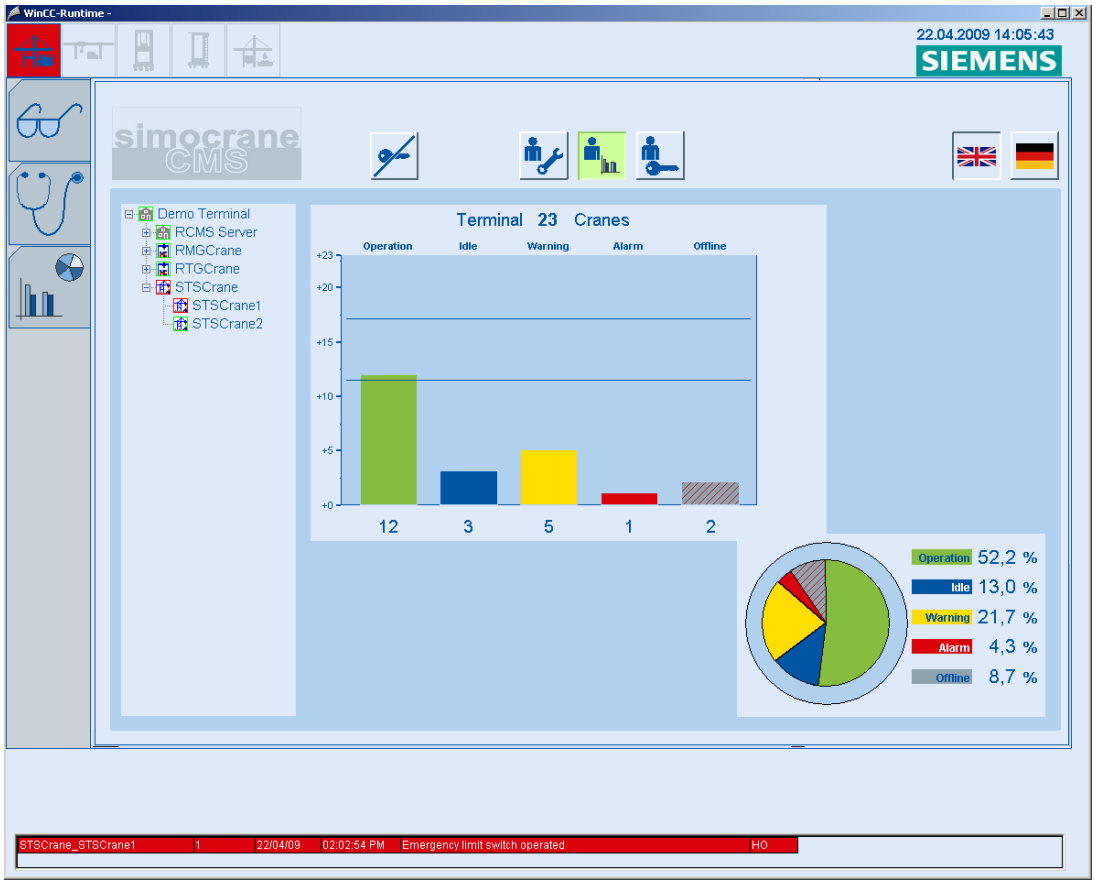


Figure 3-8 Tree view for the terminal

3.5 Fault diagnostics

Messages are displayed in a similar way as for the CMS station. You can call up the list of current messages, the list of archive messages, and the hit list of messages. The tree display allows you to select a crane, equipment type, or terminal. The associated messages appear in the list. Message lists are filtered with standard WinCC tools.

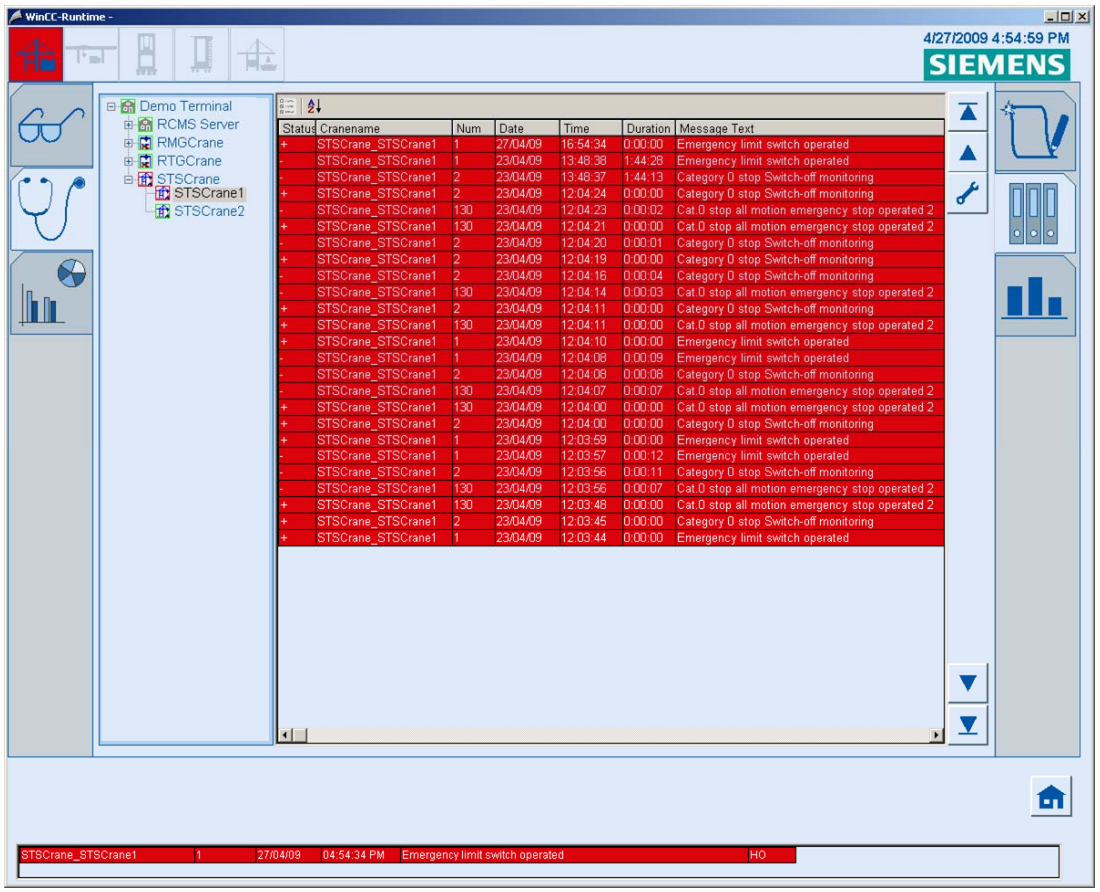

WinCC-Runtime -
4/27/2009 4:54:59 PM
SIEMENS
Demo Terminal
RCMS Server
RMGCrane
RTGCrane
STSCrane
STSCrane1
STSCrane2
Status Cranename Num Date Time Duration Message Text
+ STSCrane_STSCrane1 1 27/04/09 16:54:34 0:00:00 Emergency limit switch operated
- STSCrane_STSCrane1 1 23/04/09 13:48:36 1:44:26 Emergency limit switch operated
- STSCrane_STSCrane1 2 23/04/09 13:48:37 1:44:13 Category 0 stop Switch-off monitoring
+ STSCrane_STSCrane1 2 23/04/09 12:04:24 0:00:00 Category 0 stop Switch-off monitoring
- STSCrane_STSCrane1 130 23/04/09 12:04:23 0:00:02 Cat.0 stop all motion emergency stop operated 2
+ STSCrane_STSCrane1 130 23/04/09 12:04:21 0:00:00 Cat.0 stop all motion emergency stop operated 2
- STSCrane_STSCrane1 2 23/04/09 12:04:20 0:00:01 Category 0 stop Switch-off monitoring
+ STSCrane_STSCrane1 2 23/04/09 12:04:19 0:00:00 Category 0 stop Switch-off monitoring
- STSCrane_STSCrane1 2 23/04/09 12:04:16 0:00:04 Category 0 stop Switch-off monitoring
- STSCrane_STSCrane1 130 23/04/09 12:04:14 0:00:03 Cat.0 stop all motion emergency stop operated 2
+ STSCrane_STSCrane1 2 23/04/09 12:04:11 0:00:00 Category 0 stop Switch-off monitoring
+ STSCrane_STSCrane1 130 23/04/09 12:04:11 0:00:00 Cat.0 stop all motion emergency stop operated 2
+ STSCrane_STSCrane1 1 23/04/09 12:04:10 0:00:00 Emergency limit switch operated
- STSCrane_STSCrane1 1 23/04/09 12:04:08 0:00:09 Emergency limit switch operated
- STSCrane_STSCrane1 2 23/04/09 12:04:08 0:00:08 Category 0 stop Switch-off monitoring
- STSCrane_STSCrane1 130 23/04/09 12:04:07 0:00:07 Cat.0 stop all motion emergency stop operated 2
+ STSCrane_STSCrane1 130 23/04/09 12:04:00 0:00:00 Cat.0 stop all motion emergency stop operated 2
+ STSCrane_STSCrane1 2 23/04/09 12:04:00 0:00:00 Category 0 stop Switch-off monitoring
+ STSCrane_STSCrane1 1 23/04/09 12:03:59 0:00:00 Emergency limit switch operated
- STSCrane_STSCrane1 1 23/04/09 12:03:57 0:00:12 Emergency limit switch operated
- STSCrane_STSCrane1 2 23/04/09 12:03:56 0:00:11 Category 0 stop Switch-off monitoring
- STSCrane_STSCrane1 130 23/04/09 12:03:56 0:00:07 Cat.0 stop all motion emergency stop operated 2
+ STSCrane_STSCrane1 130 23/04/09 12:03:48 0:00:00 Cat.0 stop all motion emergency stop operated 2
+ STSCrane_STSCrane1 2 23/04/09 12:03:45 0:00:00 Category 0 stop Switch-off monitoring
+ STSCrane_STSCrane1 1 23/04/09 12:03:44 0:00:00 Emergency limit switch operated
STSCrane_STSCrane1 1 27/04/09 04:54:34 PM Emergency limit switch operated HO

Figure 3-9 List of archived messages, filtered by "STSCrane1" crane

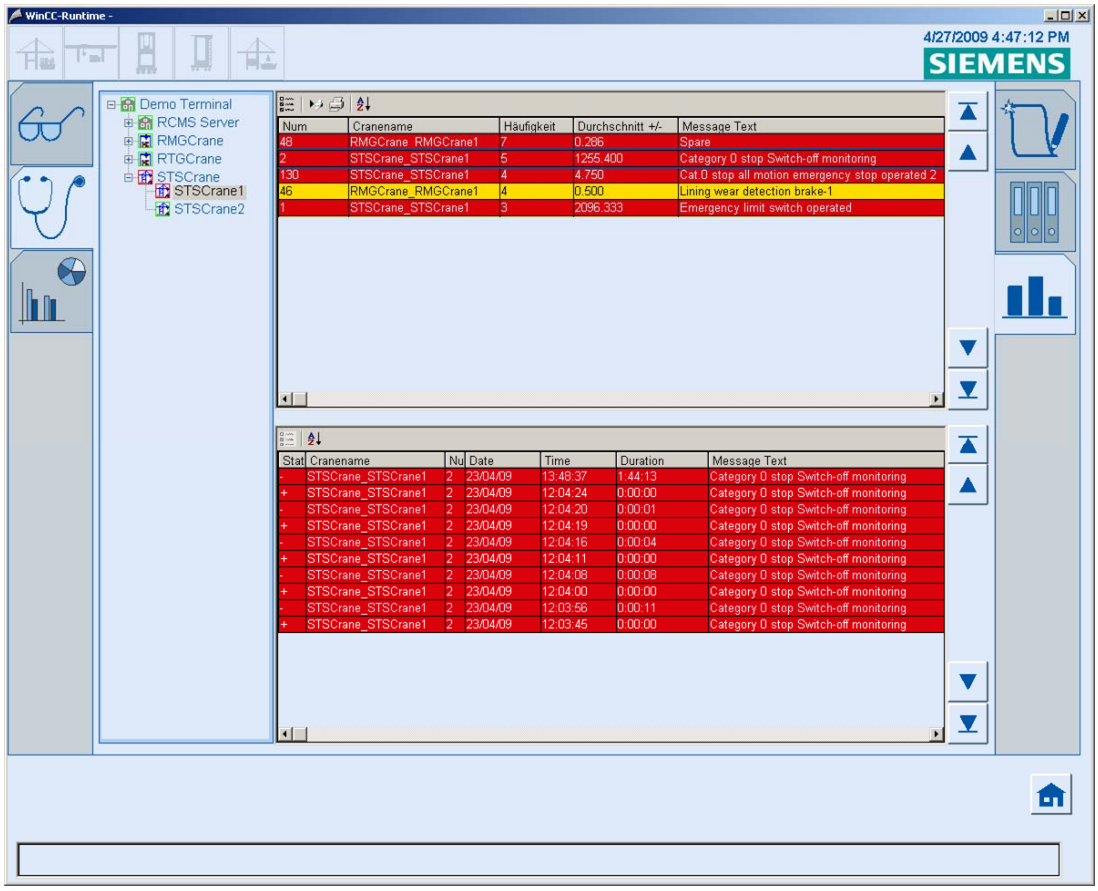
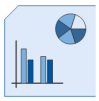

WinCC-Runtime -
4/27/2009 4:47:12 PM
SIEMENS
Demo Terminal
RCMS Server
RMGCrane
RTGCrane
STSCrane
STSCrane1
STSCrane2
Num Cranename Häufigkeit Durchschnitt +/- Message Text
48 RMGCrane_RMGCrane1 7 0.286 Spare
2 STSCrane_STSCrane1 5 1255.400 Category 0 stop Switch-off monitoring
130 STSCrane_STSCrane1 4 4.750 Cat.0 stop all motion emergency stop operated 2
46 RMGCrane_RMGCrane1 4 0.500 Lining wear detection brake-1
1 STSCrane_STSCrane1 3 2096.333 Emergency limit switch operated
Stat Cranename Nu Date Time Duration Message Text
- STSCrane_STSCrane1 2 23/04/09 13:48:37 1:44:13 Category 0 stop Switch-off monitoring
+ STSCrane_STSCrane1 2 23/04/09 12:04:24 0:00:00 Category 0 stop Switch-off monitoring
- STSCrane_STSCrane1 2 23/04/09 12:04:20 0:00:01 Category 0 stop Switch-off monitoring
+ STSCrane_STSCrane1 2 23/04/09 12:04:19 0:00:00 Category 0 stop Switch-off monitoring
- STSCrane_STSCrane1 2 23/04/09 12:04:16 0:00:04 Category 0 stop Switch-off monitoring
+ STSCrane_STSCrane1 2 23/04/09 12:04:11 0:00:00 Category 0 stop Switch-off monitoring
- STSCrane_STSCrane1 2 23/04/09 12:04:08 0:00:08 Category 0 stop Switch-off monitoring
+ STSCrane_STSCrane1 2 23/04/09 12:04:00 0:00:00 Category 0 stop Switch-off monitoring
- STSCrane_STSCrane1 2 23/04/09 12:03:56 0:00:11 Category 0 stop Switch-off monitoring
+ STSCrane_STSCrane1 2 23/04/09 12:03:45 0:00:00 Category 0 stop Switch-off monitoring

Figure 3-10 Hit list of messages for all cranes

3.6 Operational data and performance analysis



As well as displaying cargo handling data and MMBF data in a table, the RCMS server handles additional operational data and performance evaluations from the WinCC downtime monitor.

CMS-RCMS data synchronization makes the recorded operational data of all connected CMS stations available to the RCMS server in WinCC archives.

Based on a defined time model, the crane's status word, and the counters, the WinCC downtime monitor performs calculations to assess the counters and analyze the operating states. It is able to establish key performance indicators (KPI) such as a crane's availability, utilization, performance, and MMBF value. Each crane is set up as equipment in the Downtime Monitor. Analysis results are determined for each crane.

Based on the time model, the RCMS sample application represents the operating states and downtimes both graphically (Gantt chart) and in the form of a table.

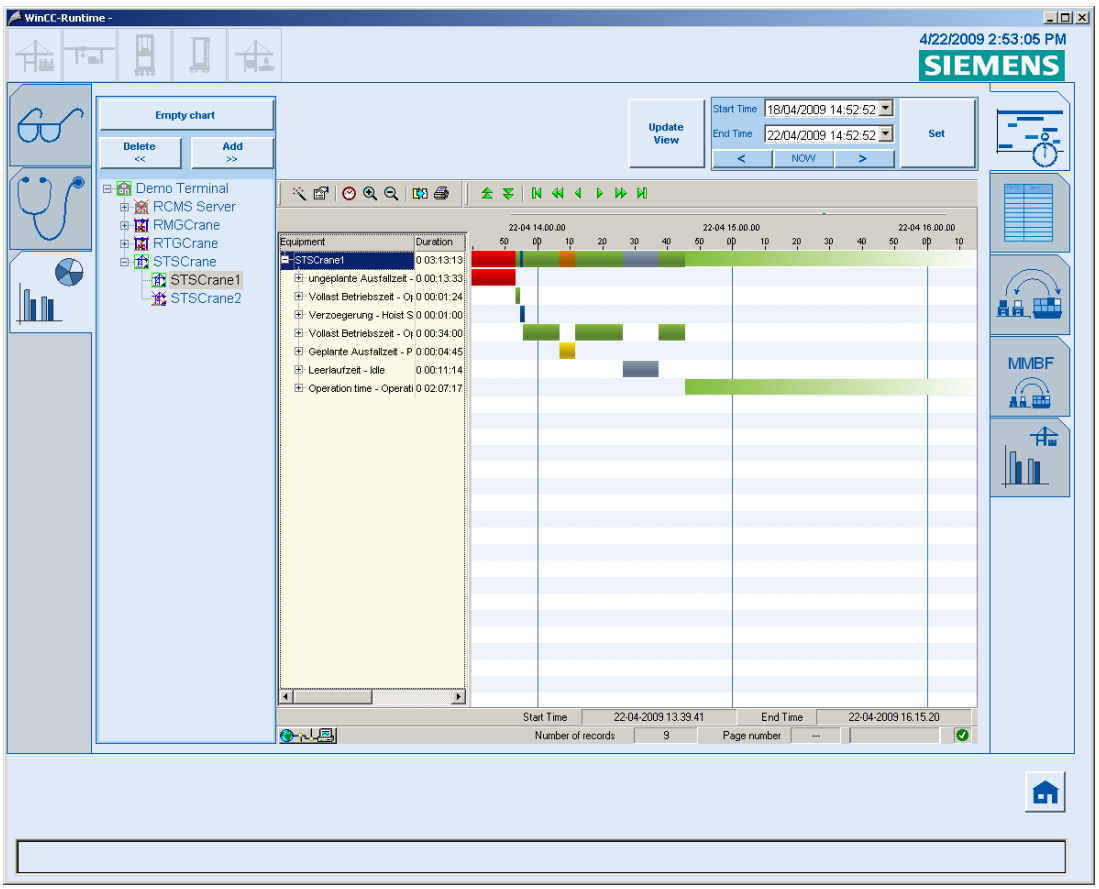


Figure 3-11 Operating states and downtimes shown in a Gantt chart

The RCMS sample application also calculates and displays the following performance data:

- Operating state
- Consumed energy
- Evaluation of downtimes (maintenance, faults, etc.)
- Performance indictors (efficiency, utilization, availability, MMBF)
- Number of containers handled (TEU, in terms of size/weight/direction)

Each analysis involves calculations for different periods (per hour, day, week, month, year). The screen below shows the duration of operating states for the last month.

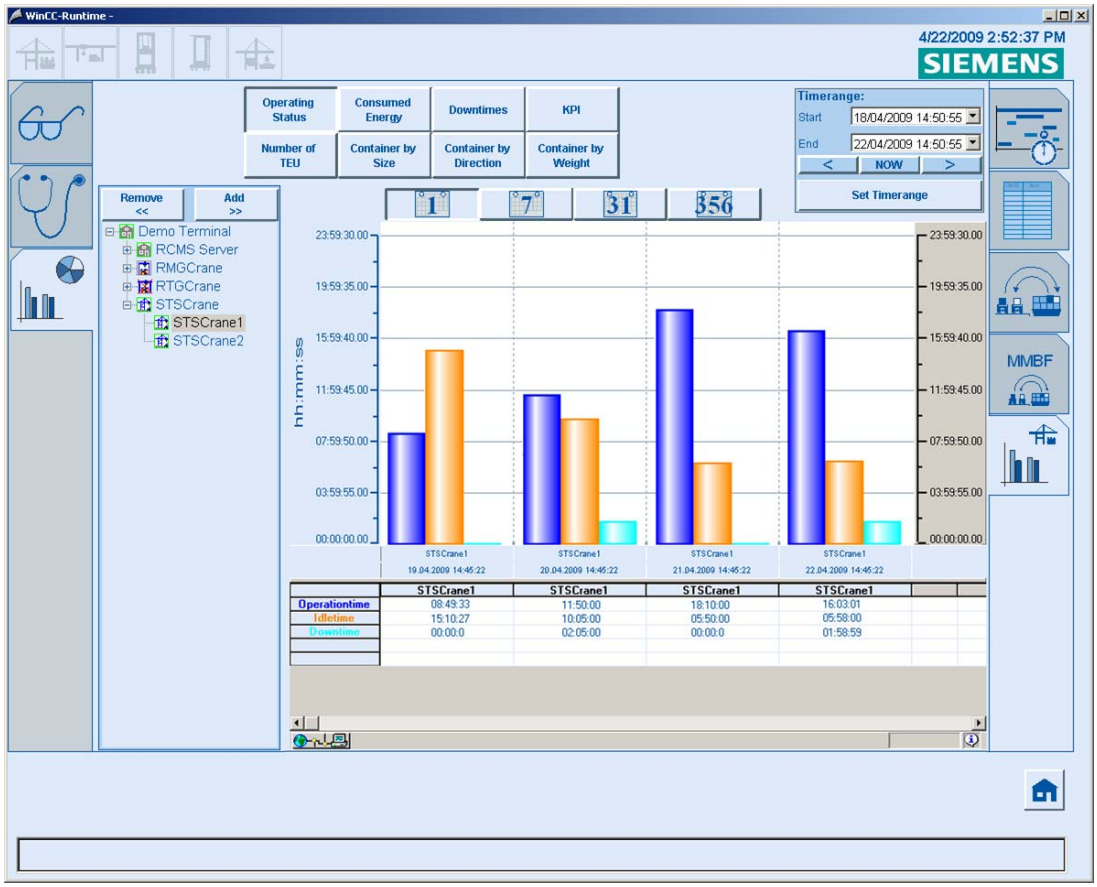


Figure 3-12 Duration of operating states

3.7 Remote access

Using WinCC Web Navigator, either the RCMS operator stations or any other stations can access the CMS station. The user sees the screens of the CMS station, but is also able to move freely within the screens.

The following diagram shows the an example of the web client calling up the CMS screens for a crane from the RCMS operator station.

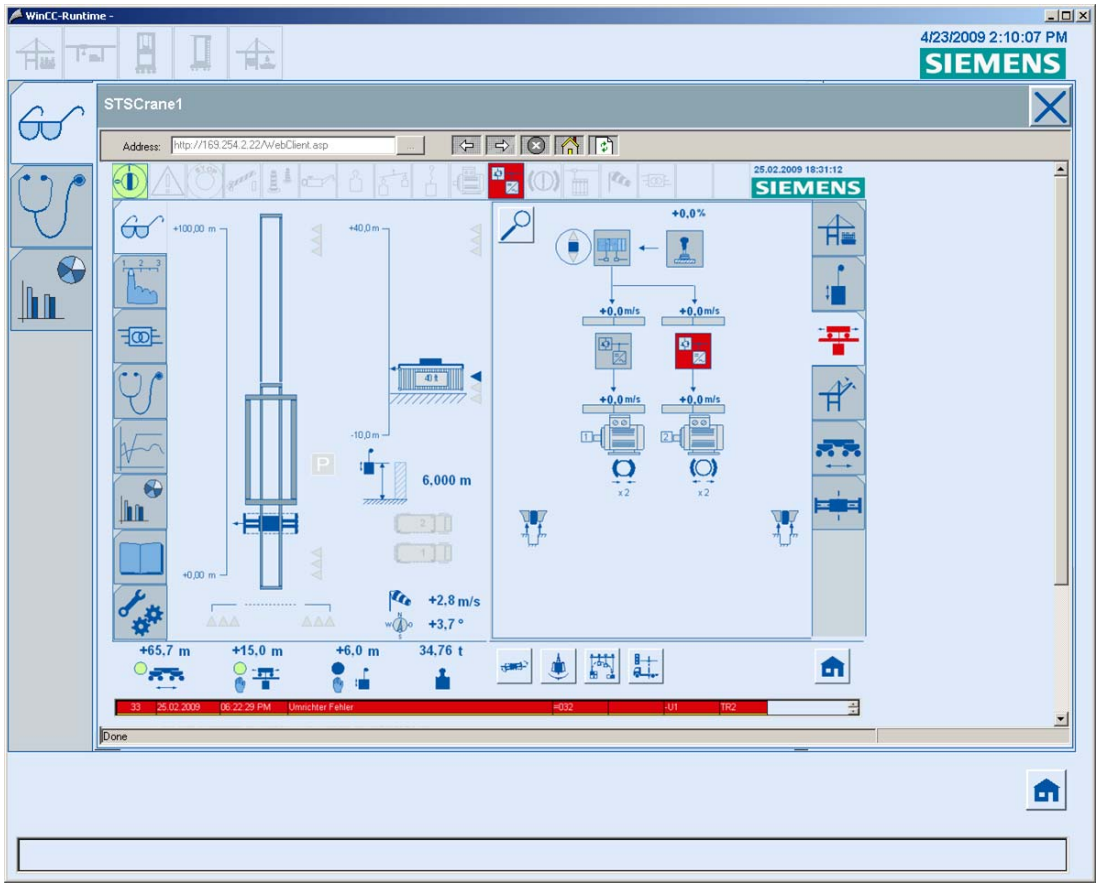


Figure 3-13 WinCC Web Navigator in the RCMS operator station

Assigning parameters and addressing 4

This chapter describes the fundamental settings you need to undertake in the CMS standard application in order to integrate them into your project environment (crane type settings, network topology, basic settings in WinCC).

The RCMS example application also supplied is suitable as an RCMS server for the local CMS station. Here too, this chapter describes the fundamental settings for integrating the standard application into your project environment and starting CMS-RCMS data synchronization.

This chapter is therefore mainly aimed at people who have to adapt the CMS standard application to specific requirements.

4.1 CMS station

4.1.1 Starting the CMS Runtime automatically

Ensure that the "CMSRuntime.exe" of the SIMOCRANE CMS WinCC add-on is entered in the Windows start-up list.

You can check whether the program has been started using the symbols in the Windows taskbar (see the operating instructions for SIMOCRANE CMS).

4.1.2 Settings in WinCC

Initial situation

In order to start the standard application on your PC, you first have to undertake some basic settings in WinCC so that the standard application's defaults can be adapted to your project environment.

Processing steps

1. Enter the name of your PC in WinCC Explorer under "Computer properties", "General" tab.

Note

Please note that the computer name must not be "CMS". You should also observe the WinCC guidelines for the assignment of a computer name. If the computer name should be the same as the crane name, then it may contain letters and numbers only. The first character must be a letter.

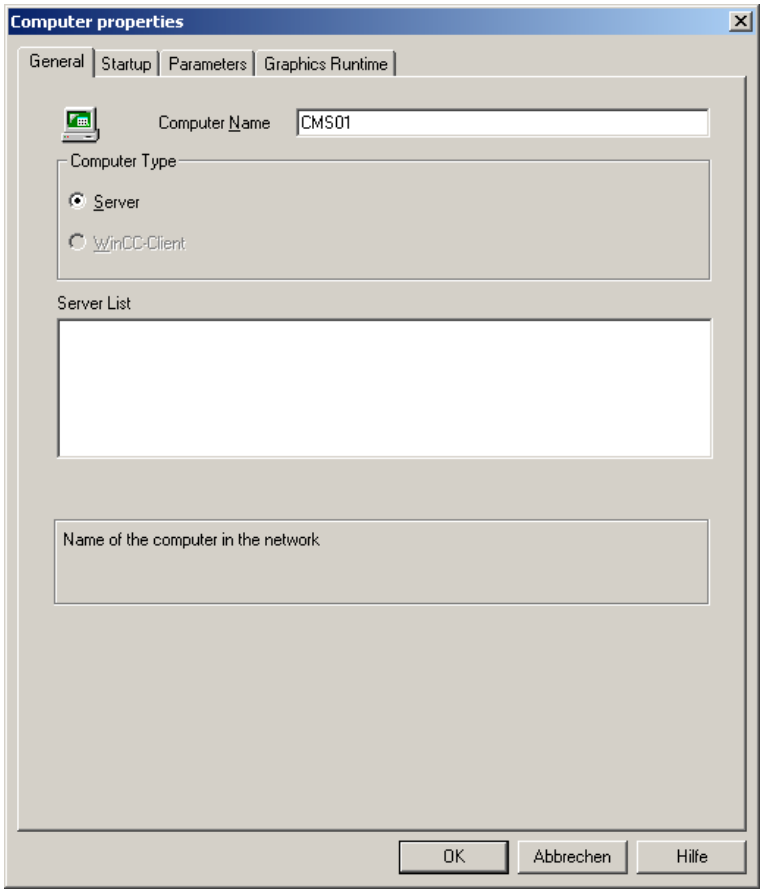


Figure 4-1 PC name setting in WinCC Explorer

2. Check the language settings for WinCC Runtime under the "Parameters" tab. Enter the runtime language required. "English" is the default runtime language in the CMS standard application. "German" is offered as the second language in delivery condition.

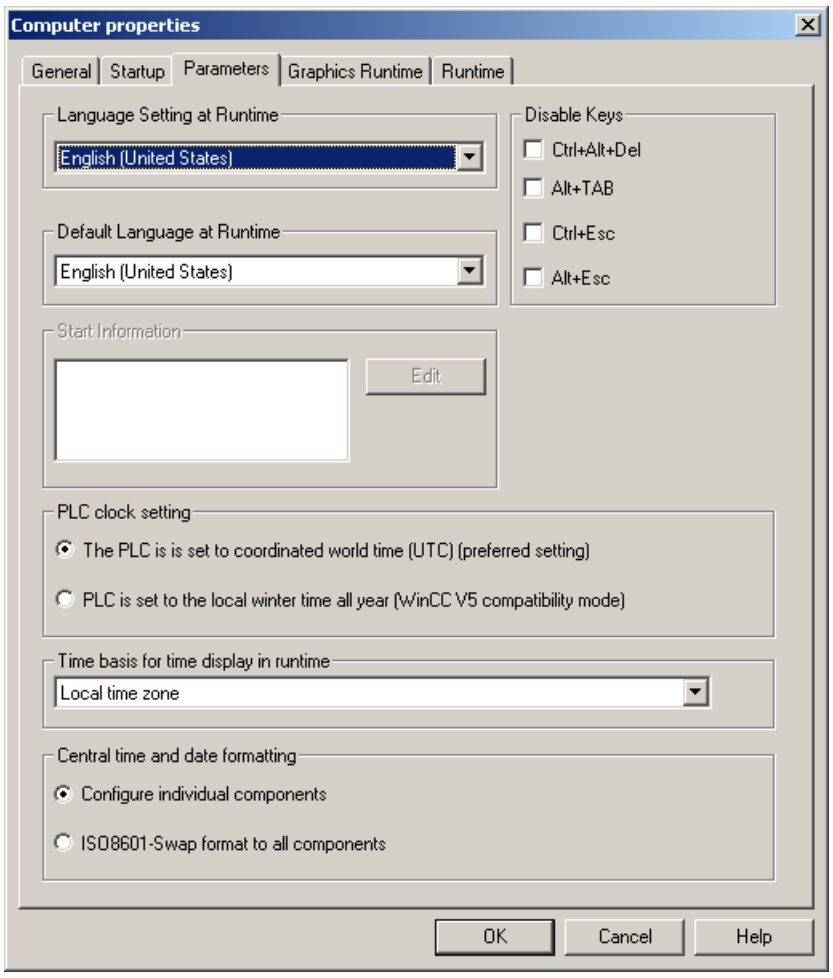


Figure 4-2 Runtime language setting in WinCC

Result

After restarting WinCC, you can launch the WinCC Runtime.

Note

Please note that after changing the computer name you will have to restart WinCC before you can make any further settings in the CMS editor.

4.1.3 Communication between the CMS station and the crane controller

Initial situation

Based on WinCC, the CMS offers various ways of establishing communication with the control level. The channels support various communication drivers. All tags are administered centrally in WinCC in tag management. You will find the interface to the crane controller in the "SIMATIC S7 PROTOCOL SUITE" communication driver in the "MPI" channel unit in the CMS standard application. The connection name is "CMS_MPI".

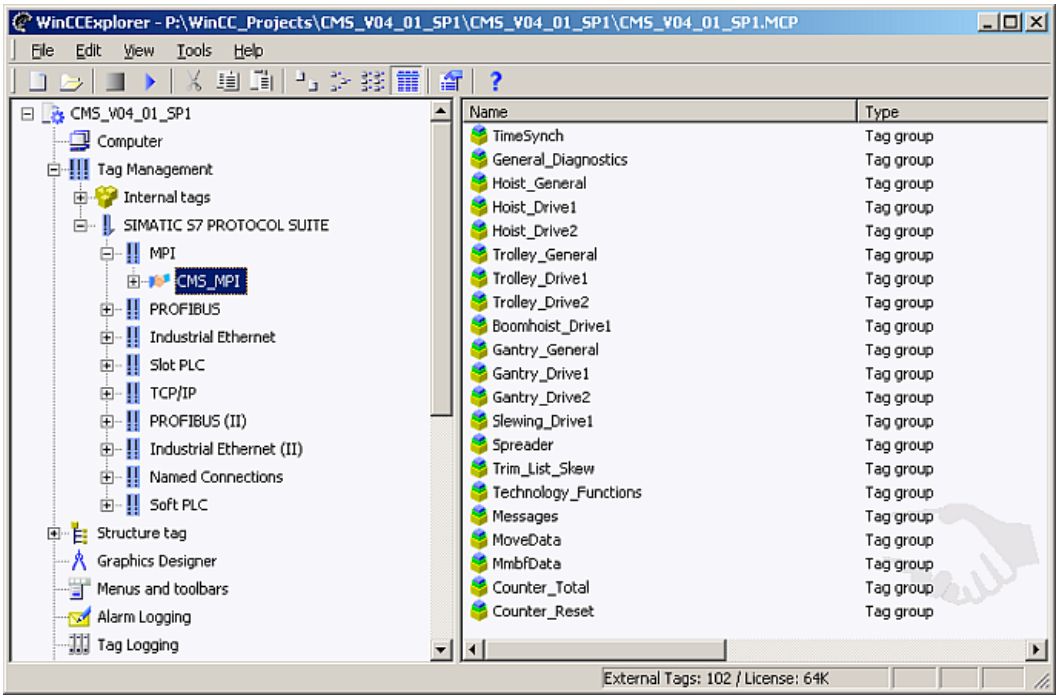


Figure 4-3 SIMATIC S7 PROTOCOL SUITE channel

The figure below shows the interface structure of the CMS standard application. The interface is split into different modules. Modules are firstly crane components and secondly modules of operational data recording.

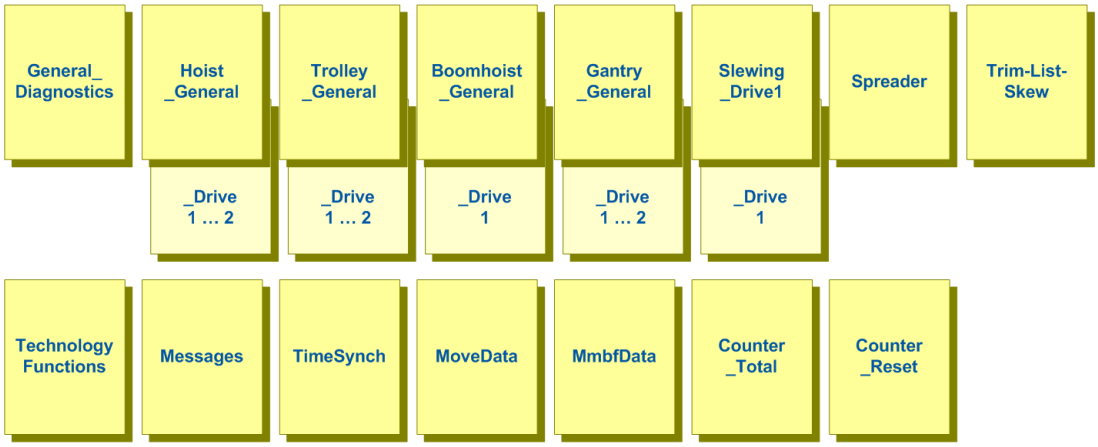


Figure 4-4 Interface overview

In the SIMATIC S7, a separate data block is defined for every module which forms the interface to the CMS. The data can be addressed in WinCC tag management via the data block and an offset in the corresponding data block. The offset, type and size of the data are described in the interface.

With a few exceptions, binary diagnostic information is read as one byte and not as a word or double word. This should prevent misunderstandings caused by different processor architectures. High and low bytes are swapped within one word for different processor architectures. The interface description is always based on the byte order in WinCC.

Processing steps

You should note the following components when assigning parameters for communication:

1. Establish the physical connection between the automation system, the crane controller and the CMS station's computer.
2. Define the communication driver for your project (e.g. "SIMATIC S7 PROTOCOL SUITE").
3. Define the channel unit (e.g. TCP/IP).
4. Create a logical connection in the channel unit (e.g. CMS_TCPIP).

5. Address the WinCC communications partner in the logical connection and define the connection parameters.

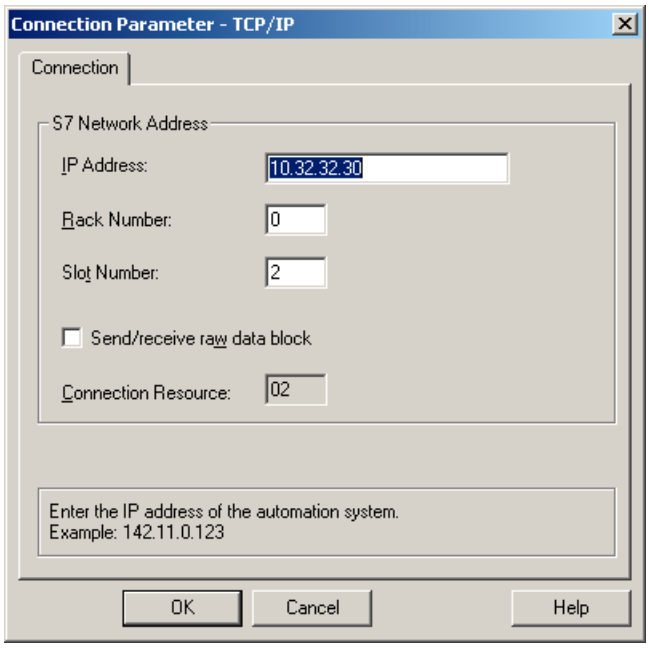


Figure 4-5 TCP/IP connection parameters

6. Open tag management in WinCC Explorer.
7. Move (do not copy!) the interface tags from the preassigned "CMS_MPI" connection to your newly created connection.
8. If you have created a connection in a channel outside the SIMATIC S7 PROTOCOL SUITE, you must adapt the addressing the requirements of the corresponding channel unit.
9. Configure the interface tags on the controller side.

4.1.4 Default settings in the standard application

Initial situation

Some parameters that are required in the status display of the standard application (limits for traveling distances) can be parameterized in the runtime interface, without changing the WinCC screens in the editor. This parameter assignment can be performed during system runtime and does not require a restart.

The settings you undertake in the runtime are written to internal WinCC tags. You can find all tags that contain settings in the internal WinCC tag group "Settings". The property "Runtime Persistence" is set for all tags of this tag group. This means that the value that this tag had before WinCC Runtime was stopped the last time, is re-established the next time that the runtime is started.

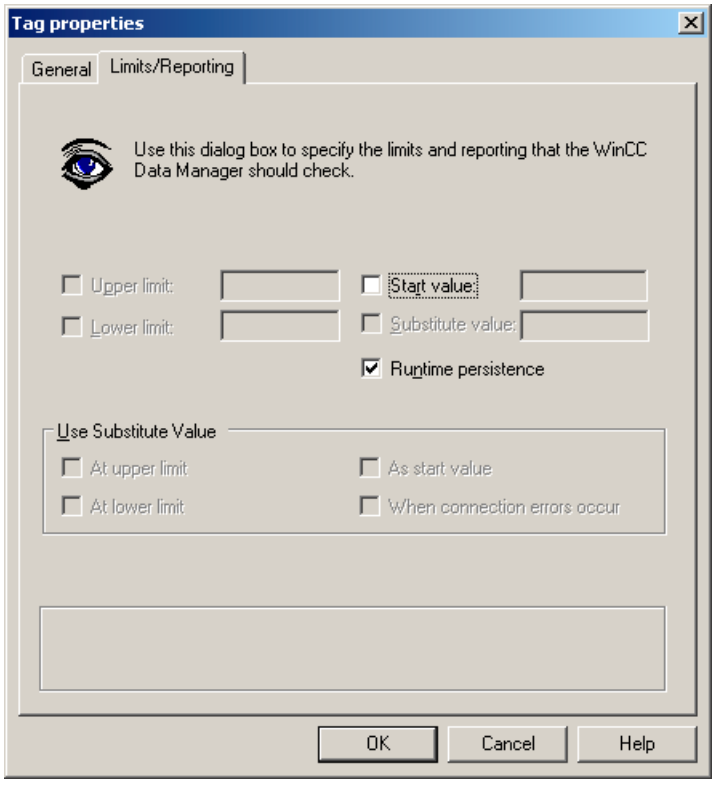


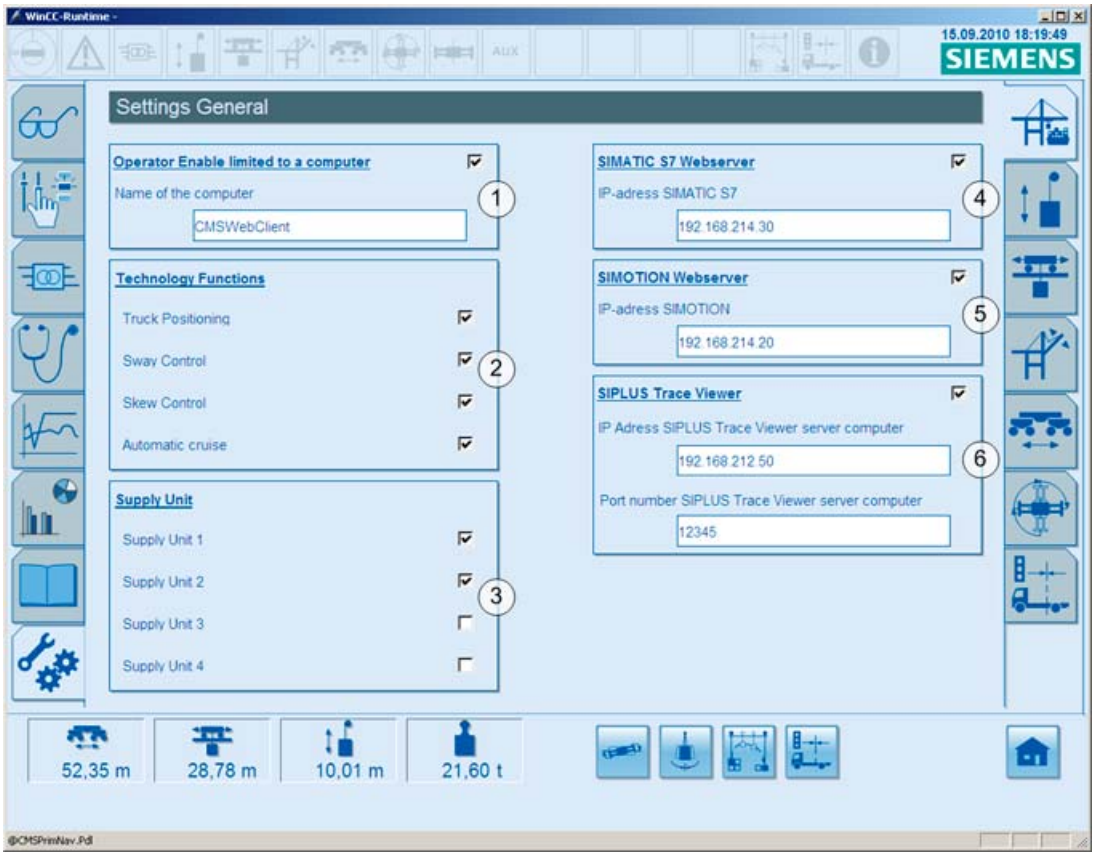
Figure 4-6 Runtime persistency

Processing steps

1. Start the WinCC Runtime.
2. Log onto the start page of the CMS user interface as an administrator.
3. Open the "Settings" menu and define your parameters in the individual tabs of the menu.

4.1.4.1 "General" tab

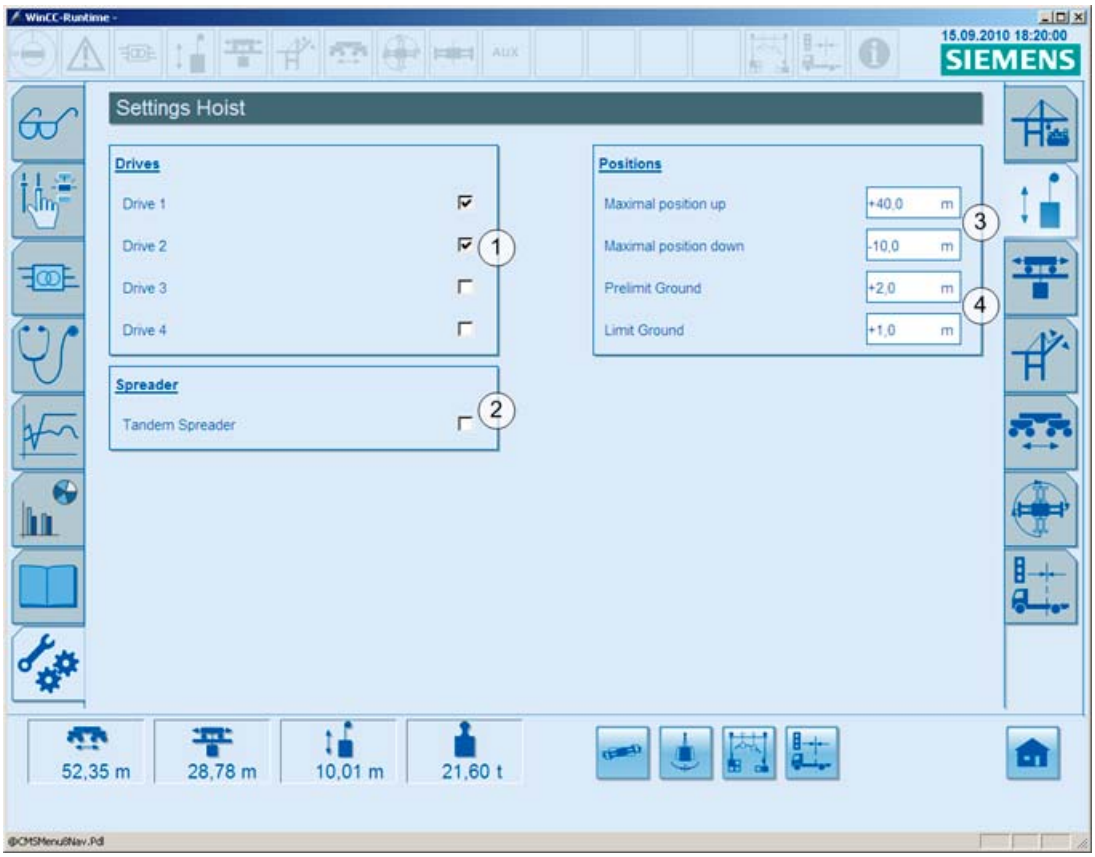
The following display provides an overview of the setting options available in the "General" tab.



① Operator enable	Select whether the operating functions in the CMS should be restricted to a certain PC (e.g. Web client in the crane cabin). Then, enter the name of the PC.
② Technology functions	Select the technology functions present. Enter the computer name (if present) of the Web Navigator client PC in the crane cabin if you want to restrict operation of the technology functions to this PC.
③ Supply units	Change the number of supply units displayed in the "Main Supply Units" tab of the CMS standard application.
④ SIMATIC S7 web server	Select whether in your project the web server on the SIMATIC S7 CPU is activated. Then enter the IP address of your S7.
⑤ SIMOTION web server	Select whether in your project the web server on SIMOTION is activated. Then enter the IP address of your SIMOTION.
⑥ SIPLUS Trace Viewer	Select whether the SIPLUS Trace Viewer is to be used in your project. Then enter the IP address and the port number of the Trace Viewer server.

4.1.4.2 "Hoist" tab

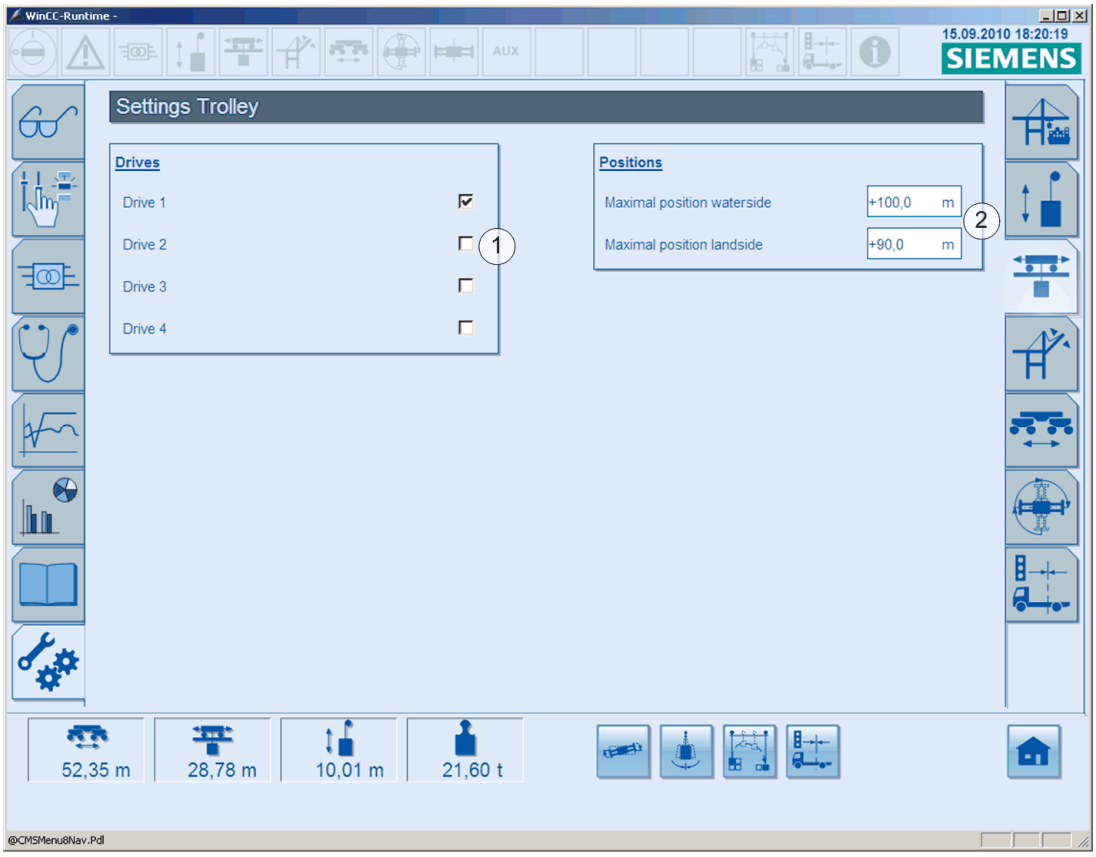
The following display provides an overview of the setting options available in the "Hoist" tab.



① Drives	Select from the drives that are present.
② Spreader	Select this option if a tandem spreader is being used.
③ Positions	"maximum position": Specify the maximum traversing position of the hoist. "minimum position": Specify the minimum traversing position of the hoist.
④ Remaining traversing distance (bottom edge of spreader → settling position)	"Prelimit Ground" Specify the position as of which the remaining traversing distance will be displayed to the crane driver. "Limit Ground": Specify the position as of which the crane driver will be warned that there is not much residual traversing distance left.

4.1.4.3 "Trolley" tab

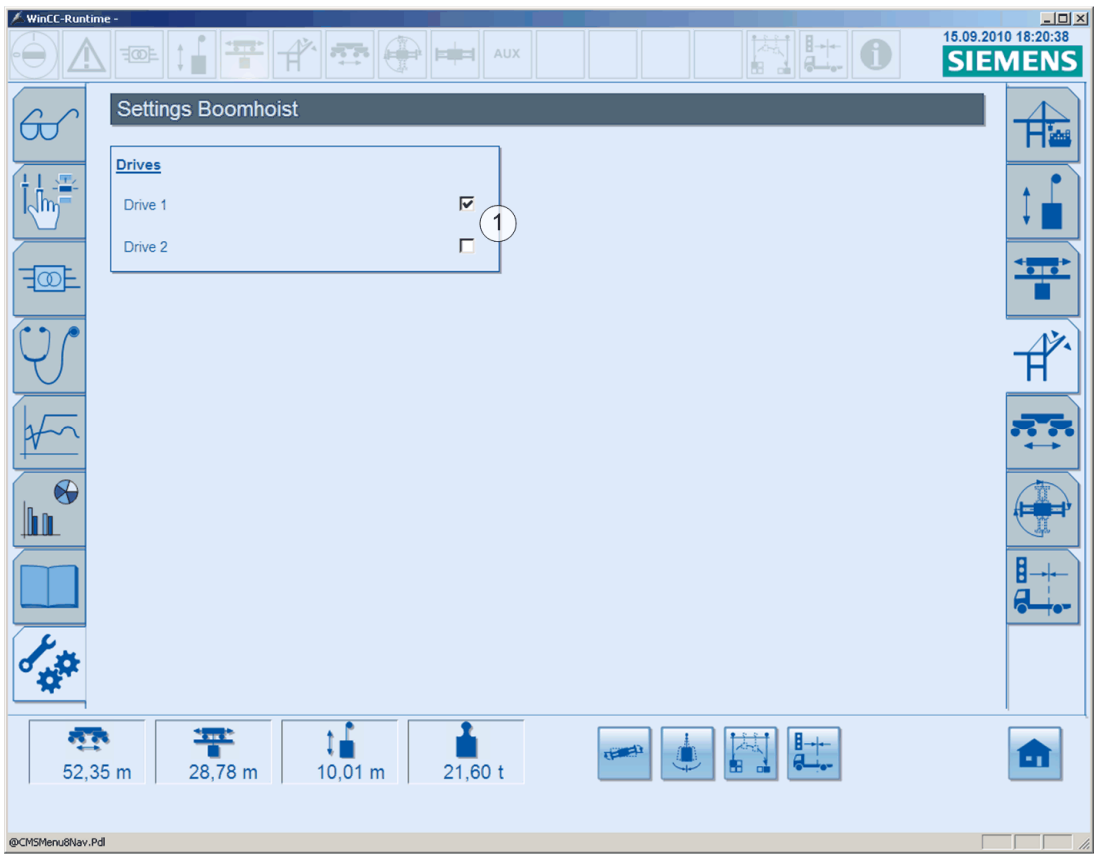
The following display provides an overview of the setting options available in the "Trolley" tab.



① Drives	Select from the drives that are present.
② Positions	"maximum position": Specify the maximum traversing position of the trolley. "minimum position": Specify the minimum traversing position of the trolley.

4.1.4.4 "Boom-hoist" tab

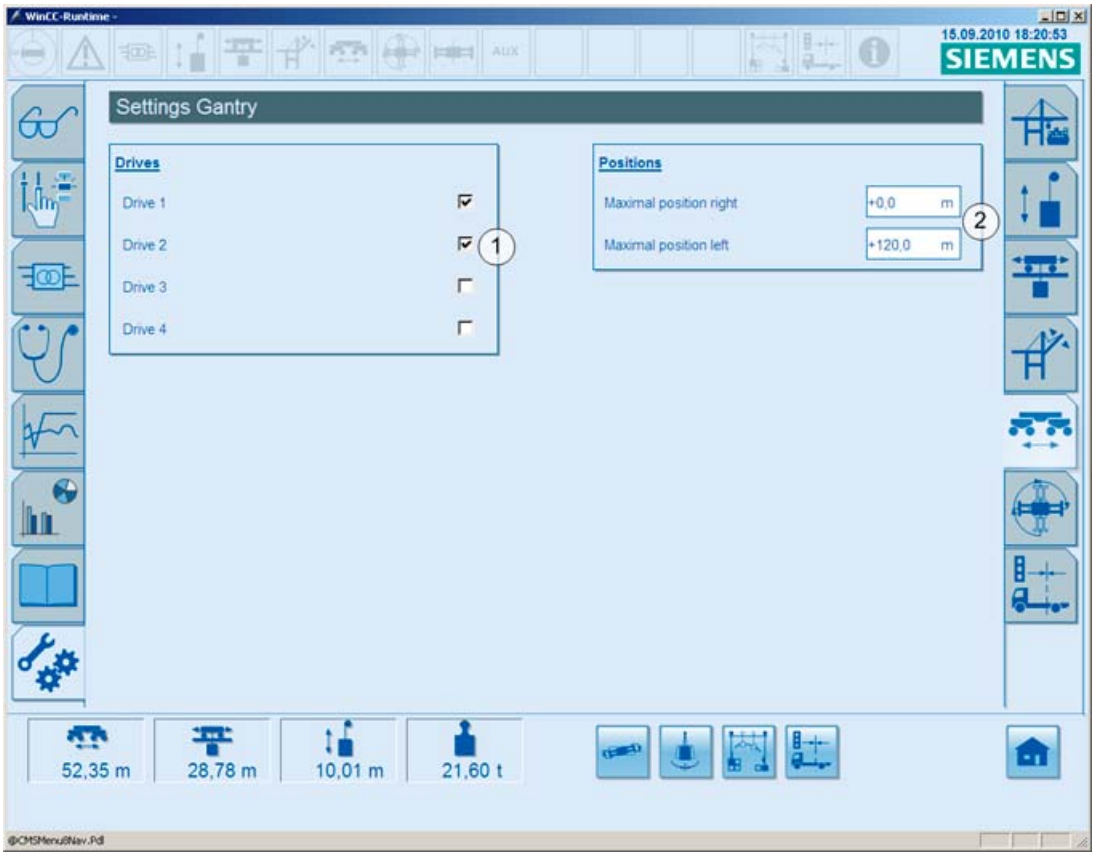
The following display provides an overview of the setting options available in the "Boom-hoist" tab.



① Drives — Select from the drives that are present.

4.1.4.5 "Gantry" tab

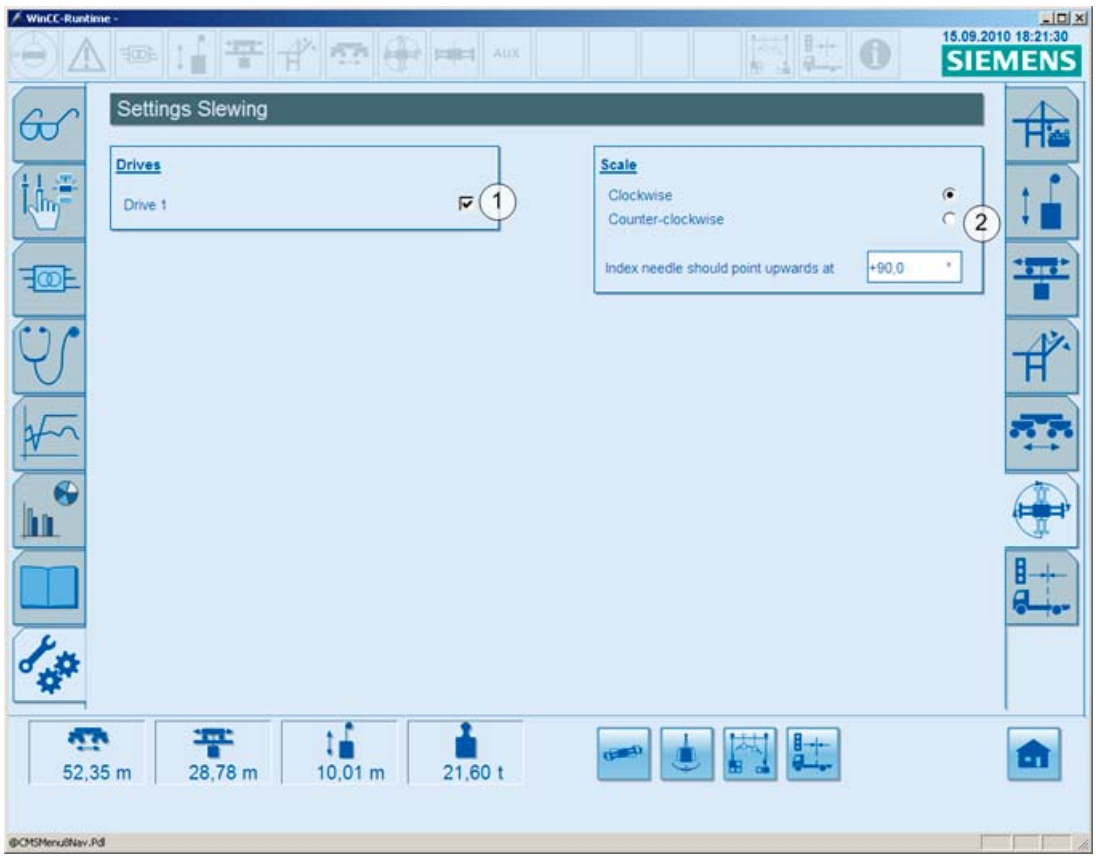
The following display provides an overview of the setting options available in the "Gantry" tab.



① Drives	Select from the drives that are present.
② Positions	"maximum position": Specify the maximum traversing position of the gantry. "minimum position": Specify the minimum traversing position of the gantry.

4.1.4.6 "Slewing gear" tab

The following display provides an overview of the setting options available in the "Slewing gear" tab.



① Drives — Select from the drives that are present.

② Scale — Select the direction of rotation (clockwise/counterclockwise direction).

Specify the angle at which the display instrument points upwards in the screen for the angle of rotation under "Index needle should point upwards at".

4.1.5 CMS topology

In terms of the following, we assume you have installed the WinCC add-on SIMOCRANE CMS on your computer and entered a valid computer name under "Computer" in the WinCC Explorer.

You can define the CMS topology in the CMS editor under "System" → "Basic settings" → "Topology". You can set:

- CMS is connected to the RCMS server.
- CMS is not connected to the RCMS server.

The "One terminal" or "Multiple terminals" setting is needed later on the RCMS server.

After installing the CMS add-ons, the topology "CMS without RCMS server" is set.

Depending on the project requirements, you can now

- define either a CMS without RCMS server
- or change the topology to form a CMS with RCMS server; in this case, configure this CMS so that in your project environment you can subsequently synchronize data with the RCMS server.

Note

Some dialogs of the CMS editor are only available to you if your Windows user belongs to the CMS administrator group.

Processing steps - setting the topology

1. Open the CMS editor using the icon in WinCC Explorer.
2. Open the "System" → "Basic settings" → "Topology" dialog.

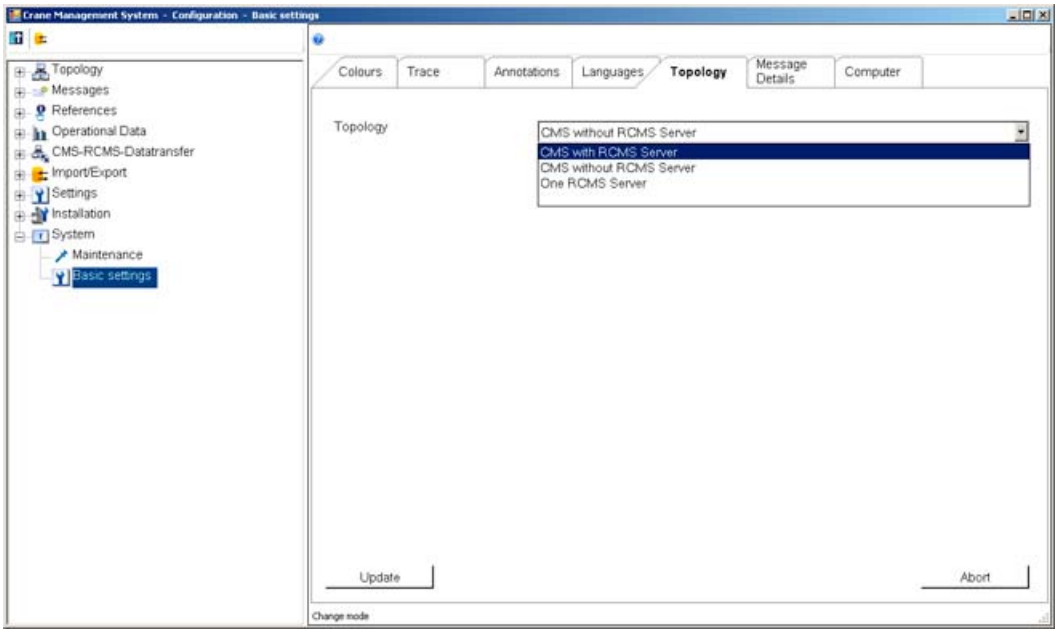


Figure 4-7 Changing topology

3. In the list, select "CMS with RCMS server".
4. Click "OK" to confirm your change.
5. Close and re-open the CMS editor to accept the setting. The CMS with connected RCMS server has more setting options than a CMS without RCMS server.

If you selected the topology "CMS with RCMS server", then each change of the data in the CMS editor is marked in color (yellow). This marking indicates that a change has been made at the CMS station, which is still not available at the RCMS (also see Chapter Transferring configuration data (Page 137)).

Processing steps – create equipment type

Every crane in the CMS must be assigned to a specific equipment type.

1. Open the "Topology" → "Equipment" dialog.

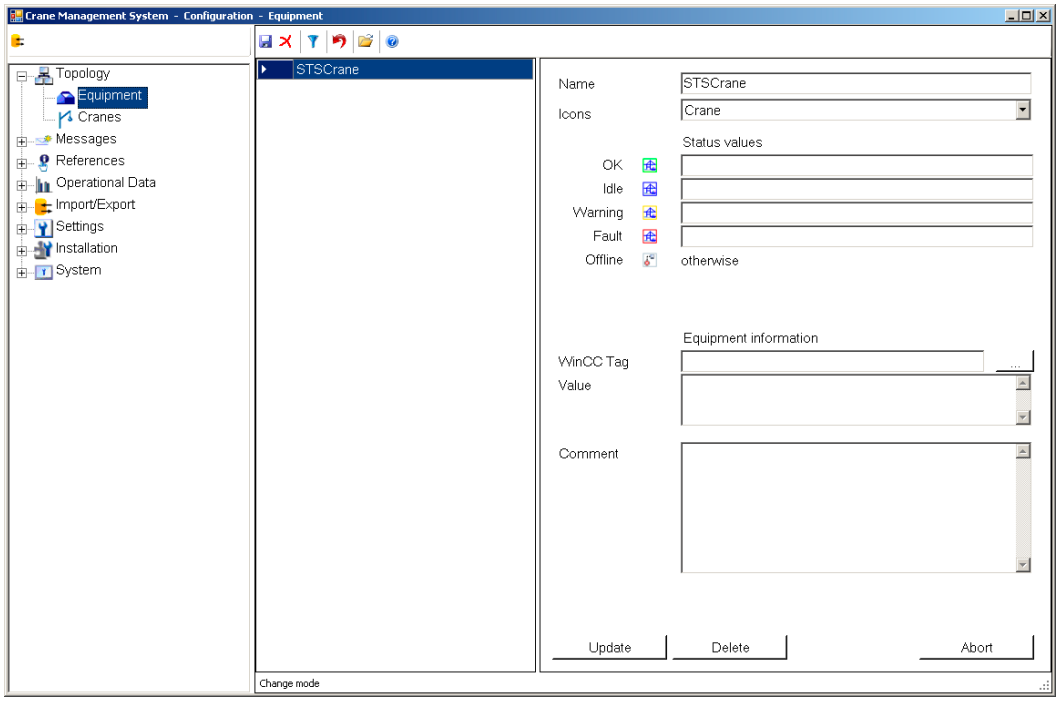


Figure 4-8 Defining the equipment type in the CMS editor (topology "CMS without RCMS server")

2. You can define the equipment type for your crane (e.g. "STSCrane") here.

Note

Note that the name of the equipment type may only contain letters and numbers. The first character of the name must be a letter.

3. If you selected the topology "CMS with RCMS server", then your equipment type presently being processed and the associated entry is shown in the editor tree as "changed".

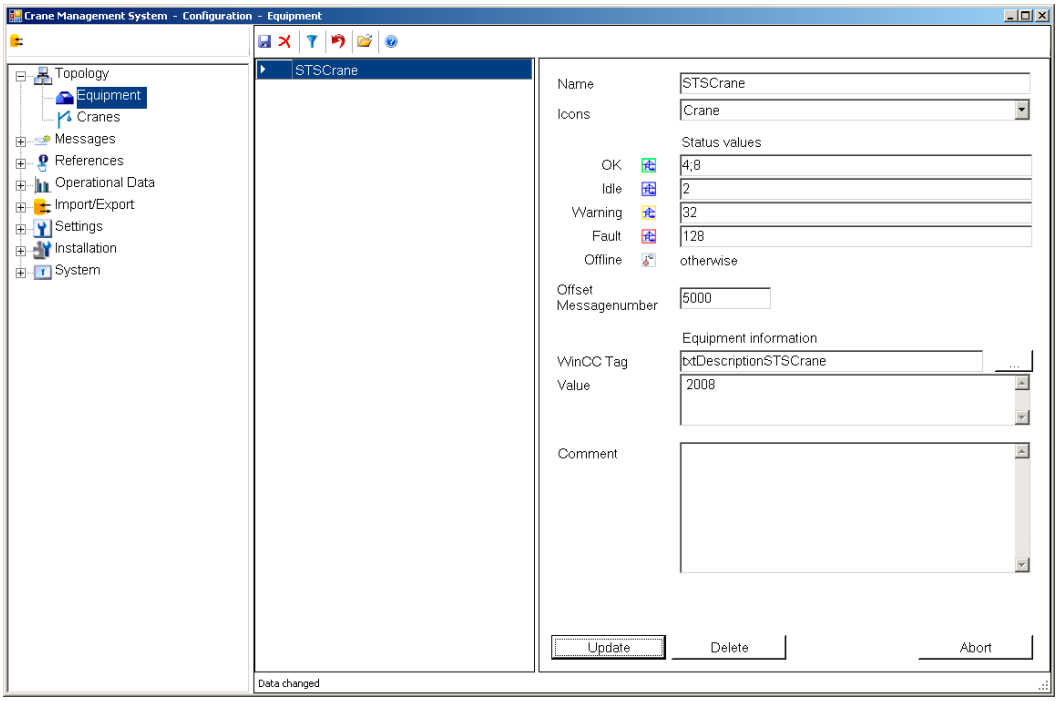


Figure 4-9 Defining the equipment type in the CMS editor (topology "CMS with RCMS server")

Processing steps – create crane with CMS without RCMS server

1. Open the "Topology" → "Cranes" dialog.
2. You can enter the name of your crane in the "Name" field (e.g. "STSCrane1").

Note

Note that the crane name may only contain letters and numbers. The first character of the crane name must be a letter.

3. Enter the computer name for the CMS station in the "Computer name" field.

Note

Please note that the computer name cannot be precisely called "CMS". You should also observe the WinCC guidelines for the assignment of computer names. If the computer name should be the same as the crane name, then it may contain letters and numbers only. The first character of the computer name must be a letter.

4. Select an equipment type.
5. Click "OK" to confirm your changes.

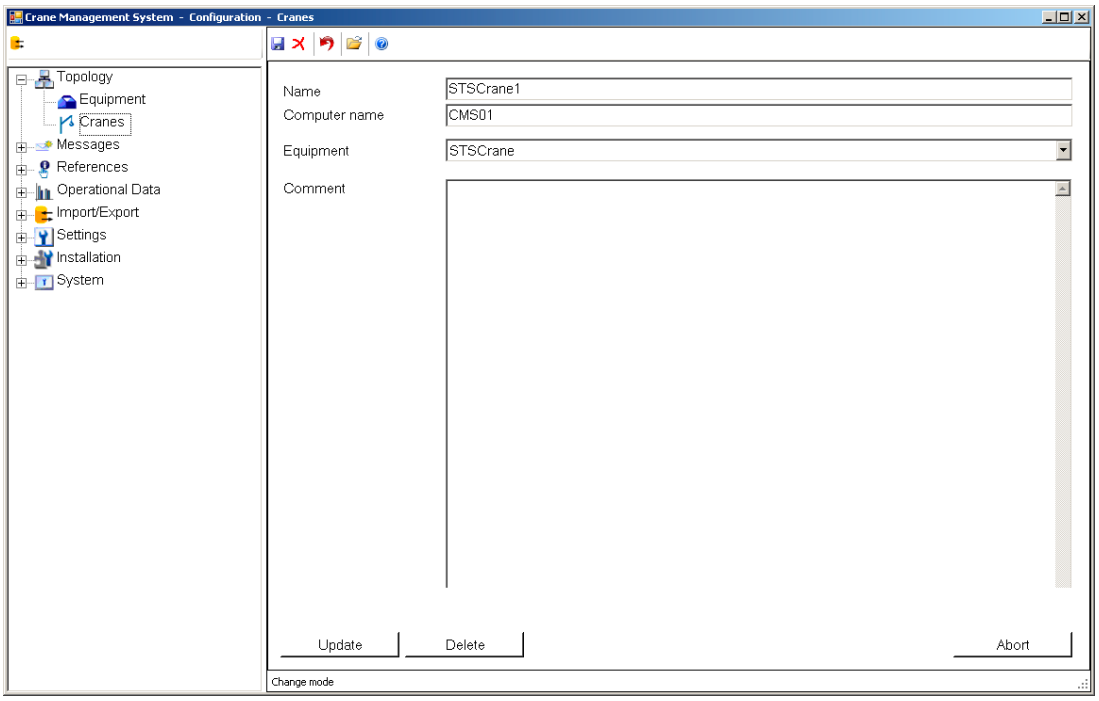


Figure 4-10 Configuring a crane with CMS without connected RCMS server in the CMS editor

Processing steps – create crane with CMS and connected RCMS server

1. Open the "Topology" → "Cranes" dialog.

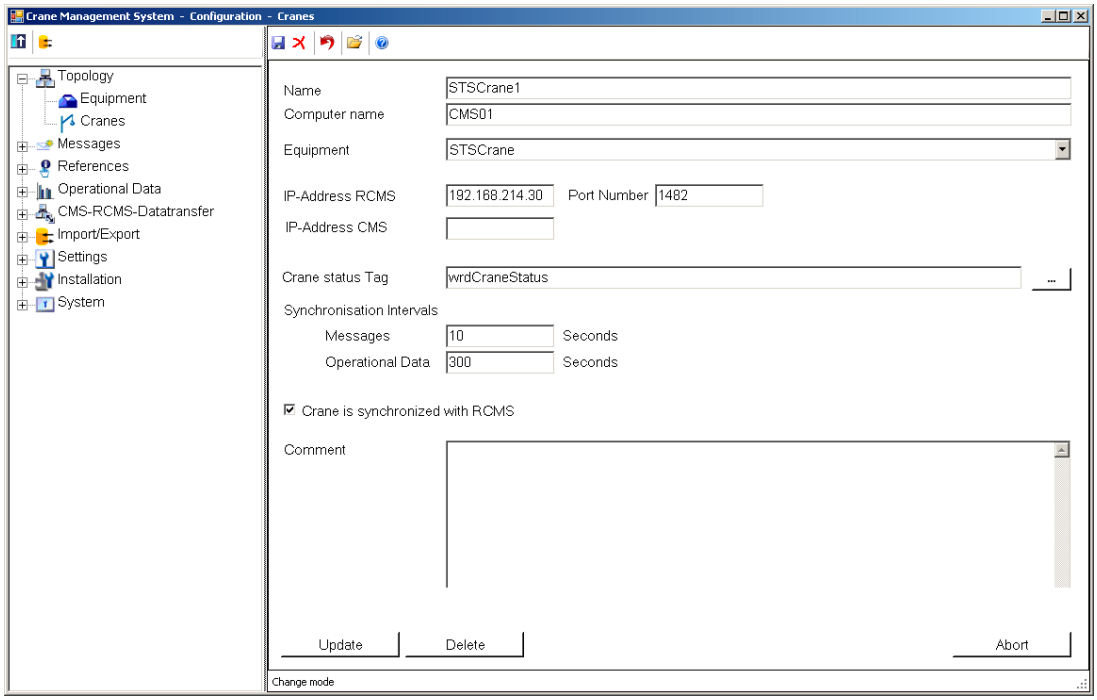


Figure 4-11 Configuring a crane with CMS and connected RCMS server in the CMS editor

2. Enter the name of the crane in the "Name" field (e.g. "STSCrane1").

Note

Note that the crane name may only contain letters and numbers. The first character of the crane name must be a letter.

3. Enter the computer name for the CMS station in the "Computer name" field.

Note

Please note that the computer name cannot be precisely called "CMS". You should also observe the WinCC guidelines for the assignment of computer names. If the computer name should be the same as the crane name, then it may contain letters and numbers only. The first character of the computer name must be a letter.

4. Select an equipment type (e.g. "STSCrane") under "Equipment type".
5. Specify the IP address of the RCMS server in the "IP-Address RCMS" field.
6. Enter the number of the port that is to be used for communication with the RCMS server in the "Port number" field. Ensure that the port number is the same on the CMS and RCMS sides.
7. The "IP Address CMS" field remains empty if your PC only has one network card. If your PC has several network cards, then the IP address, via which communication is established with the RCMS server, must be located in this field.

8. In the field "Crane status tag", select the WinCC process tag in which the controller sends the status of the crane. The status word is especially used on the RCMS server (see Chapter RCMS topology (Page 149)). Transfer to the RCMS server is realized automatically. Here, the tag receives the crane name as a prefix.
9. Specify the RCMS update cycles for messages and operational data.
10. Select "Crane is synchronized with RCMS". If this option is not selected, then neither configuration data nor runtime data will be transferred.
11. Confirm with "OK".

    If you selected the topology "CMS with RCMS server", then the crane that you are presently processing and the associated entry are shown in the editor tree as changed.
12. Restart CMS Runtime to activate the changes to the communication parameters.

4.1.6 CMS system tags

There is a range of system tags which is automatically created and supplied in a "CMS" tag group on the CMS station. Their content is entered in runtime, e.g. from the information of the CMS editor (Topology → Cranes).

Table 4- 1 CMS system tags

Tag name	Data type	Bit	Description
@CMSCraneName	Text tag 8-bit character set	-	Name of the crane
@CMSEquipment	Text tag 8-bit character set	-	Equipment type to which the crane belongs
@CMSIPAddress	Text tag 8-bit character set	-	IP address of the CMS station
@CMSConnectionState	Unsigned 16-bit value		Connection status to the RCMS server
		0	(CMS station / RCMS server) When starting the CMS Runtime, no major errors occurred. All local functions are active. There is no connection to the RCMS server.
		1	(CMS station / RCMS server) When starting the CMS Runtime, no major errors occurred. All local functions are active. The connection to the RCMS server / to all CMS stations is active.
		2	(RCMS server) When starting the CMS Runtime, no major errors occurred. All local functions are active. The connection to at least one CMS station is not active.

Tag name	Data type	Bit	Description
		7	(CMS station / RCMS server) CMS Runtime cannot run. When starting CMS Runtime, a fault has occurred that prevents CMS Runtime from being executed (e.g. WinCC Runtime has not been started, a crane has not been defined in the CMS editor, a wrong computer name has been entered into the CMS editor, ...). You can find more information on this fault in the CMS error file in the folder …\CMS of the WinCC project directory.

4.1.7 Alarm/event system for the CMS station

The CMS alarm/event system is based on WinCC Alarm Logging. Additional crane-specific requirements of the alarm/event system are covered by the CMS add-on for WinCC. While the WinCC messages are displayed in a WinCC Alarm Control, the CMS add-on provides a separate control of additional message information. It has already been integrated into the CMS standard application (MessagesInfo.pdl).

You can find a detailed description of this integration in Chapter Additional message information in the CMSFaults control (Page 187).

4.1.7.1 Message procedures

The WinCC Alarm Logging basically supports two message procedures:

- Bit message procedure (message tag)
- Chronological reporting (message telegram)

The CMS standard application uses the bit message procedure. Here the controller signals the occurrence of an event by means of a message tag. The time stamp of the message is issued by WinCC Alarm Logging.

With chronological reporting, the time stamp of an alarm event is issued by the controller and sent to WinCC as a message telegram. This message procedure assumes the appropriate configuration on the controller side.

4.1.7.2 Message blocks

Message blocks are configured in the WinCC Alarm Logging. They contain the information which is displayed in a message.

The table below shows the message blocks that are defined in the CMS standard application. You can adjust the message blocks to suit your project requirements. However, the process value blocks 1 and 2 (crane name, equipment type) must always be used for message transmission to the RCMS and may not be used for project-specific purposes. Message block 10 is prepared for displaying the contents of both the process value blocks.

Table 4- 2 Message blocks

Name	Category	Number	Size	Description
Date	System block	1	dd:mm:yyyy	Date of time stamp
Time	System block	2	hh:mm:ss	Time of time stamp
Duration	System block	3	dd hh:mm:ss	Period between "incoming" status and "outgoing" status
Status	System block	5	1 char	Message status (incoming, outgoing)
Number	User text block	1	4 char	Fault number
PID	User text block	2	5 char	Plant identification (=xxx)
LID	User text block	3	5 char	Location identification (+xxx)
DID	User text block	4	5 char	Device identification (-xxx)
Message text	User text block	5	90 char	Information about the message
Source	User text block	6	12 char	S7 block / network
Reference	User text block	7	10 char	Reference in circuit diagram
Group	User text block	8	4 char	Message group
Equipment type:: crane name	User text block	10	32 char	Mandatory attribute for CMS/RCMS data synchronization. Content is mandatory: @2%s@::@1%s@
Crane name	Process value block	1	32 char	Reserved for CMS
Equipment type	Process value block	2	32 char	Reserved for CMS
Process value	Process value block	3	32 char	Process value

4.1.7.3 Message classes and message types

Message classes and message types are configured in the WinCC Alarm Logging.

The table below shows the message classes and message types which are defined in the CMS standard application. The message class 16 (CMS) and the subordinate message types are mandatory for use in CMS system messages and may not be changed. The message class is created automatically. You can modify all other message classes and message types.

Table 4- 3 Message classes and message types

Class	Class number	Type	Type number	Status	Color
Fault	1	Fault in general	1	incoming (+)	218, 4, 15
				outgoing (-)	218, 4, 15
Warning	4	Warning in general	49	incoming (+)	255, 221, 0
				outgoing (-)	255, 221, 0
Event	7	Info Operator	97	incoming (+)	204, 255, 153
				outgoing (-)	204, 255, 153
MMBF	14	External	209	incoming (+)	218, 4, 15
				outgoing (-)	218, 4, 15
		Internal	210	incoming (+)	218, 4, 15
				outgoing (-)	218, 4, 15
CMS	16	CMS fault	241	incoming (+)	218, 224, 227
		CMS warning	242	incoming (+)	80, 103, 116
		CMS info	243	incoming (+)	218, 224, 227

4.1.7.4 Group messages

In the CMS, each WinCC single message is assigned to a group message. The group messages are configured in the WinCC Alarm Logging and can be structured hierarchically, so that a subordinate group message also initiates the higher-level group message. The diagram below shows the group hierarchy of the CMS standard application:

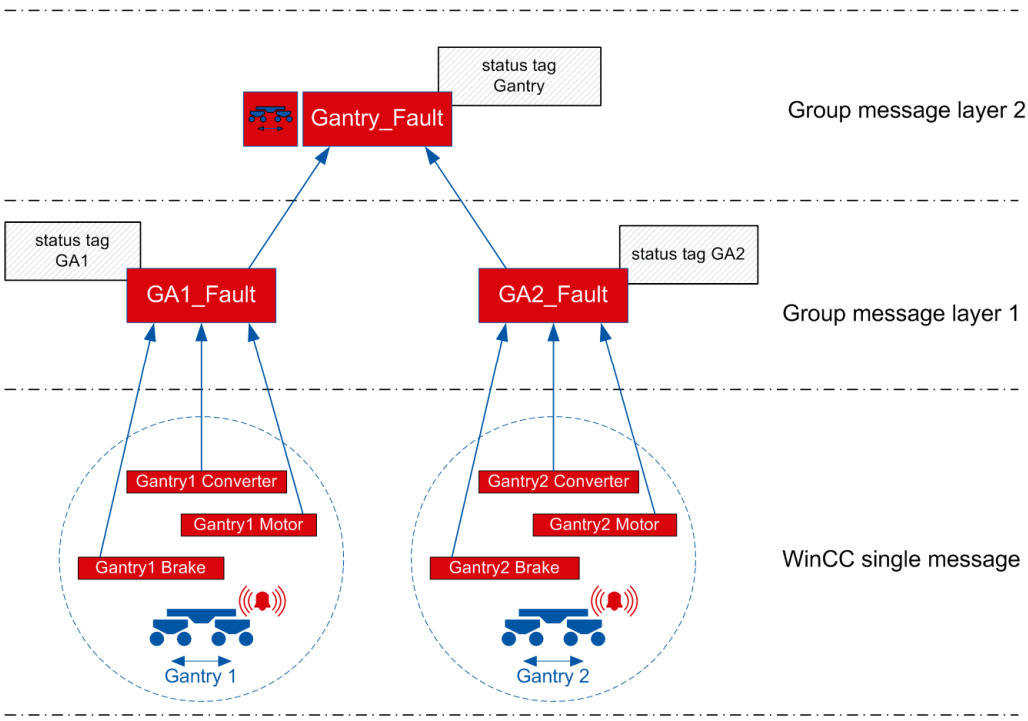


Figure 4-12 Principle of the group message in the CMS

All of the individual messages of class "Faults of gantry 1" are assigned to an alarm group" "GA1_Fault". If such an individual message occurs (e.g. "Gantry1 fault brake"), then the directly assigned group message ("GA1_Fault") and also the higher-level group message ("Gantry_Fault") are output.

A status tag can be defined for each configured group message defined, in which a status bit is set when the group message is initiated.

This status tag can be evaluated in the user interface:

- Configuring a group fault display in the group fault display (e.g. group messages level 2)
- Initiating group messages (e.g. group messages level 1)

A group fault display visualizes the message statuses in a suitable form for the message classes of the standard application:

- Inactive (status tag = 0)
- Event (status bit 1 set)
- Warning (status bit 2 set)
- Fault (status bit 3 set)

The status of a group fault display is dynamized using the status tag of the group messages:

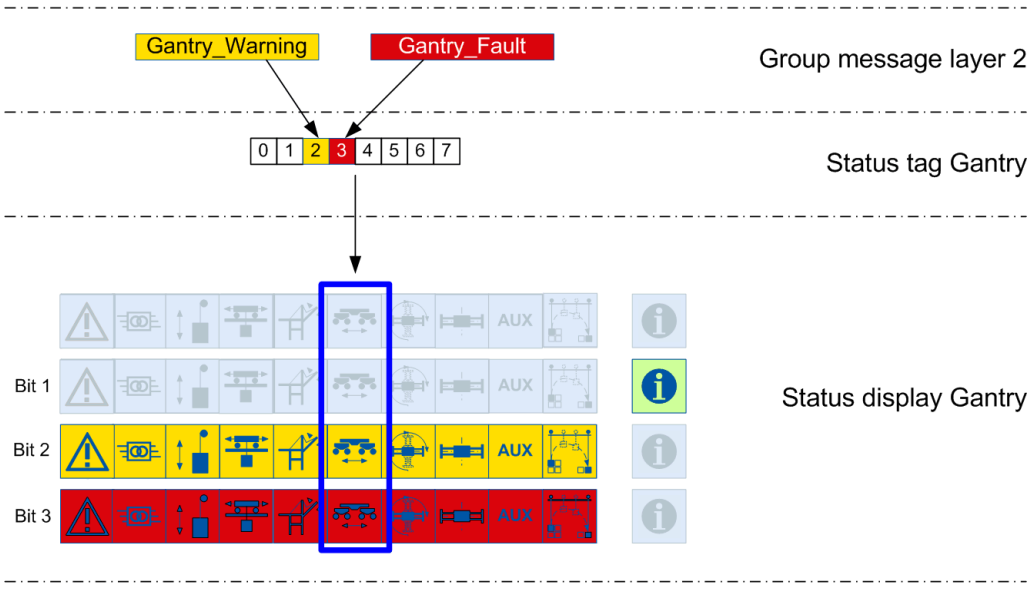


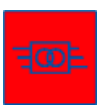
Figure 4-13 Group fault display in the CMS

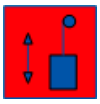
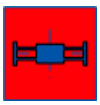
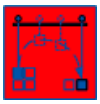
Fault messages from crane gantry 1 initiate the "Gantry_Fault" group message; see diagram "Principle of the group message in the CMS". When the group message is initiated, bit 3 in the assigned status tags is set.

For individual messages of the class "Warning", there is an analogous hierarchy. The group message, "Gantry_Warning" sets bit 2 in the status tags. For operator messages, there is an additional "Event" state. Bit 1 is set in the assigned status tags. The status displays are configured so that the fault bit has the highest priority.

The following table shows the complete group hierarchy for the message class "Fault". The group hierarchy for the class "Warning" is structured in the same way. For events there is only one group message.

Table 4- 4 Group messages for visualizing the group faults

Symbol	Display group	Alarm group	Description
	General_Fault	GE_Fault	General crane
	Supply_Fault	LVD_Fault	Low voltage distribution
		SU1_Fault	Supply unit 1
		SU2_Fault	Supply unit 2
		SU3_Fault	Supply unit 3
		SU4_Fault	Supply unit 4
		CRH_Fault	Cable reel high voltage

Symbol	Display group	Alarm group	Description
	Hoist_Fault	HO_Fault	Hoisting gear or holding and closing gear
		HO1_Fault	
		HO2_Fault	
		HO3_Fault	
		HO4_Fault	
	Trolley_Fault	TR_Fault	Trolley or luffing gear
		TR1_Fault	
		TR2_Fault	
		TR3_Fault	
		TR4_Fault	
	Boomhoist_Fault	BH_Fault	Boom-hoist
		BH1_Fault	
		BH2_Fault	
	Gantry_Fault	GA_Fault	Gantry
		GA1_Fault	
		GA2_Fault	
		GA3_Fault	
		GA4_Fault	
	Slewing_Fault	SL_Fault	Slewing gear
		SL1_Fault	
		SL2_Fault	
	Spreader_Fault	SPR_Fault	Spreader
		CRS_Fault	Cable reel spreader
	Auxiliary_Fault	AUX_Fault	Other auxiliary gear
		TLS_Fault	Trim list skew
		RT_Fault	Rope tensioning
		LHV_Fault	Lighting, heating, ventilation
	TechFunction_Fault	AUT_Fault	Automatic
		TPS_Fault	"Truck positioning"
	OM		"Operator messages"

4.1.7.5 Archive configuration

The archive configuration for messages is defined in the WinCC Alarm Logging. Adapt the size and archiving period of the archive and individual segment to the project requirements under "Archive configuration".

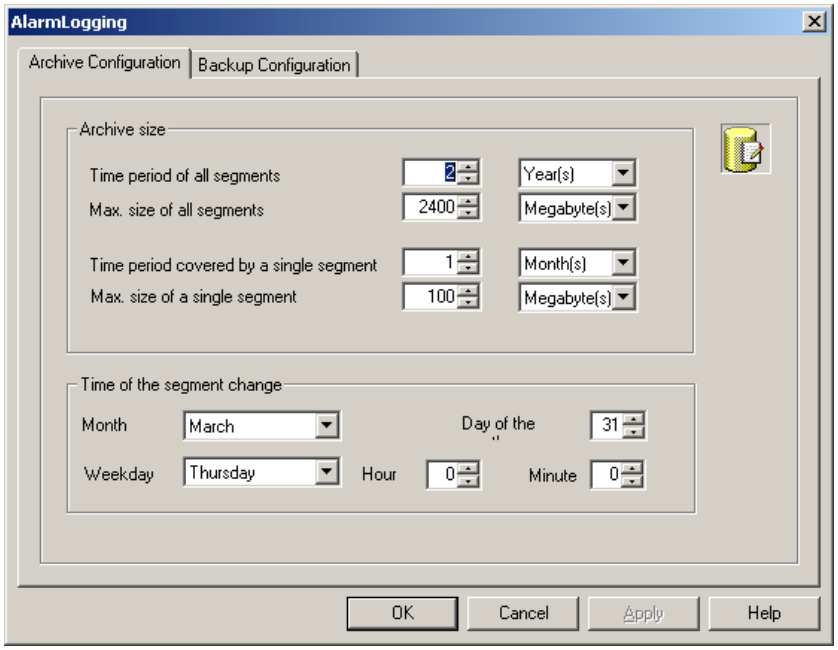


Figure 4-14 Archive configuration of the message archive in the WinCC Alarm Logging editor

You can set how many messages are to be re-established after a power failure under "Reload after power failure". When the system is restarting, pending messages are checked to see if they were received before the power failure.

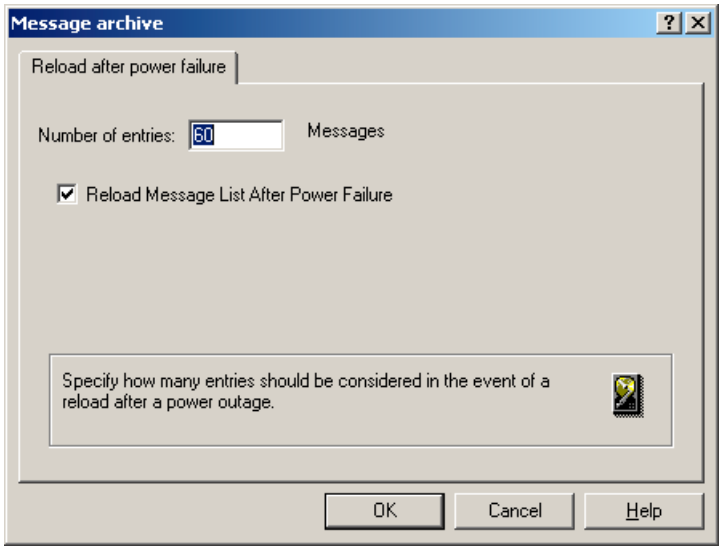


Figure 4-15 Reloading messages in the case of a power failure

4.1.7.6 Message import in the WinCC Alarm Logging

Initial situation / objective

WinCC Alarm Logging features an import function for individual messages so you don't have to create all the messages manually. The import file must be available in text format (*.txt).

Refer to the WinCC documentation for the structure of the import file and meaning of the parameters.

Processing steps

1. Ensure that all message classes, message types, message blocks and message groups used in the import file are created in the WinCC Alarm Logging.
2. Ensure that all tags used (message and process value tags) are present in the WinCC tag management.
3. Use the "Import messages" dialog to import the messages from the WinCC Alarm Logging toolbar "Messages" → "Import individual messages…".
4. Once the import process is complete, a message appears and you can read the import status off this. You can check here whether the import is free from faults.

4.1.7.7 Maintenance instructions in the CMS configuration editor

Initial situation / objective

You can assign a maintenance instruction to each message that is available in WinCC Alarm Logging. Only one maintenance instruction can be assigned to each WinCC message. But several messages can be assigned to each maintenance instruction.

Below is a description of how to manually configure a maintenance instruction. However, you can also use an import function (xml format). It is best to start by manually configuring and exporting an instruction. Then you can use this template to extend the import file.
The CMS operating instructions contain a detailed description of the import function.

Processing steps

Here is an example of how to configure maintenance instructions:

1. Open the CMS editor under "Messages" → "Maintenance instructions"
2. Use "New" to create a new maintenance instruction.
3. Under "Description", enter a name for the maintenance instruction (e.g. Category 0 Stop). The "Description" field is mandatory.

4. In the "Possible cause" and "Possible remedy" fields enter information about a fault's cause and remedy.

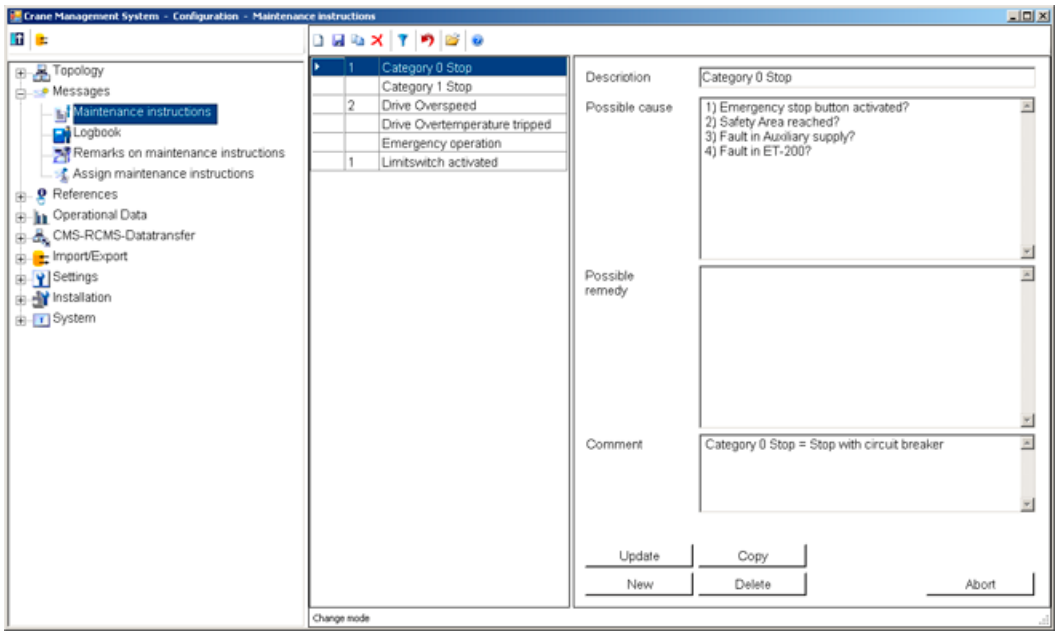


Figure 4-16 Configuring maintenance instructions in the CMS editor

5. Open the dialog for assigning maintenance instructions to a message under "Messages" → "Assign maintenance instructions".

   You will find a list of all existing message numbers on the left.

6. When you select a message, an info text appears along with information from the message text blocks.
7. Select your maintenance instruction from the "Maintenance instructions" list and assign it the message number you want either using drag & drop or the arrow keys.

   On the right-hand side next to the name of maintenance instruction, it is shown how often this note is assigned to a message.

   If you selected the topology "CMS with RCMS server", then new or changed maintenance notes – as well as the associated entry – are shown in the editor tree as having been changed.

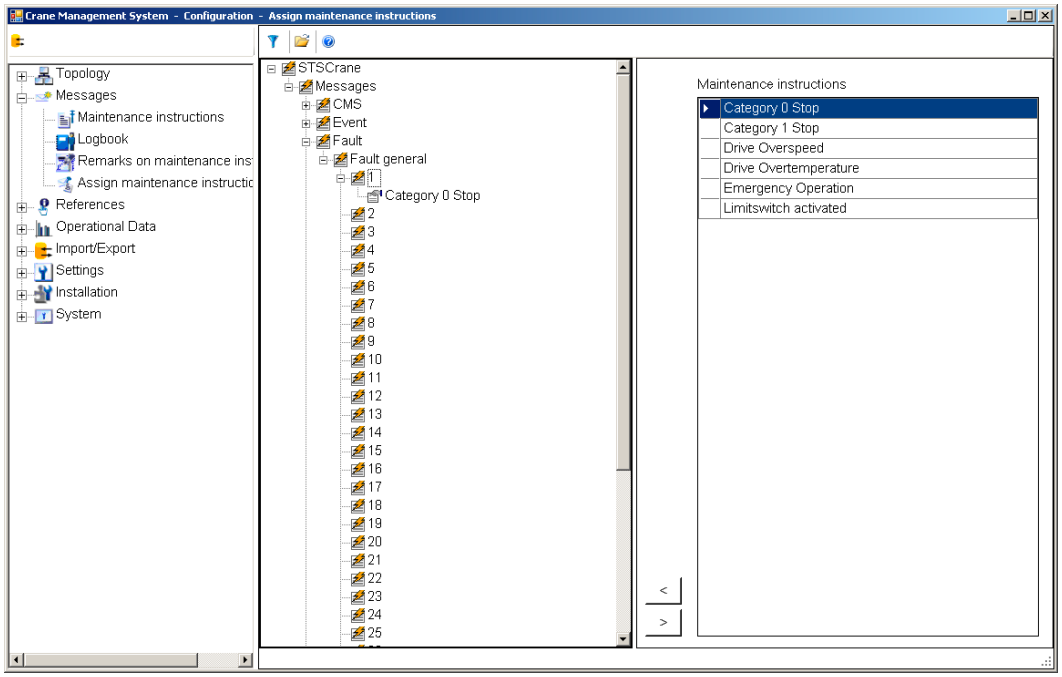


Figure 4-17 Assignment of maintenance instructions to a WinCC message in the CMS editor

4.1.7.8 Remarks on maintenance instructions

Initial situation / objective

In the CMS application, the user can enter additional remarks to existing maintenance instructions in runtime. Such entries appear in the corresponding field along with information about the maintenance instruction already displayed.

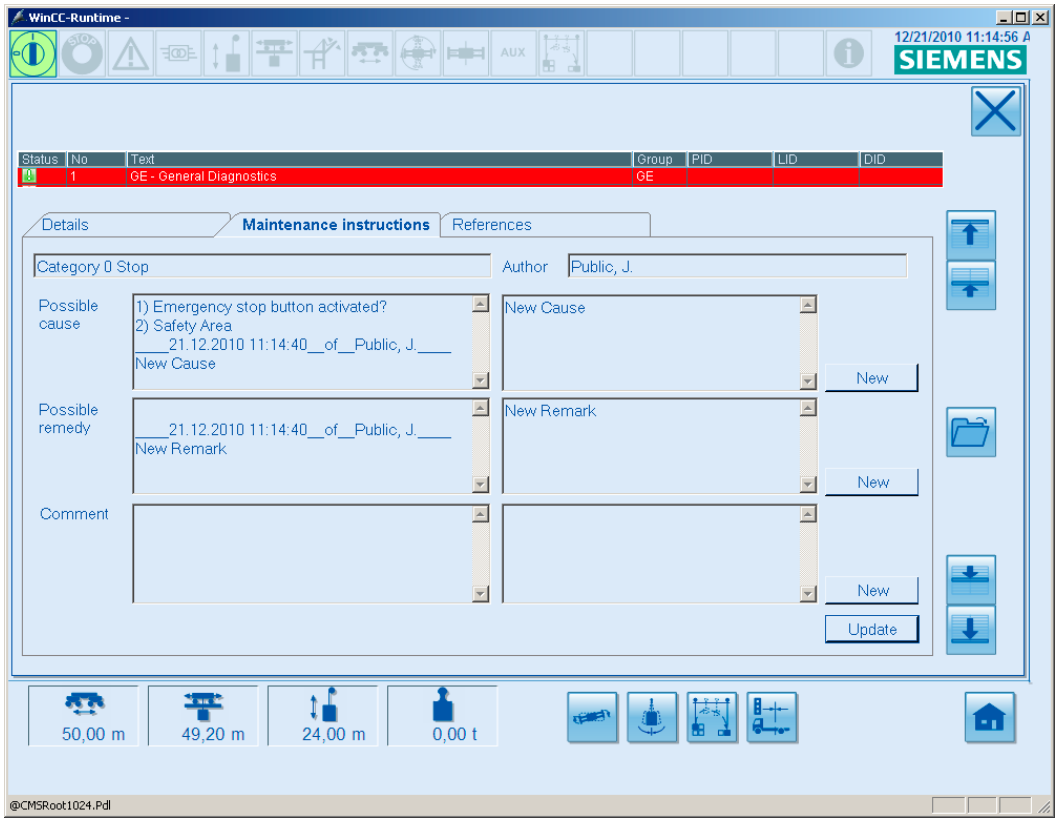


Figure 4-18 Remarks on maintenance instructions

You can define the scope of assignment for the remarks entry for the maintenance instructions. The remarks can be assigned as follows:

- local: Archiving of remark for precisely this message number
- global: Archiving of remark for maintenance instruction; this option is of interest if you have assigned a maintenance instruction to several messages.

All remarks entered can also be displayed or edited in the CMS editor.

Processing steps

1. Open the CMS editor.

2. You can open and edit the texts of remarks entered under "Messages" → "Remarks on maintenance instructions". You will find the remarks in the tree shown at the corresponding message number.
3. An overview of the entries made can be found under "Messages" → "Logbook". This contains a list of who made an entry for the maintenance instructions and when this was done (author and time stamp) in Runtime.

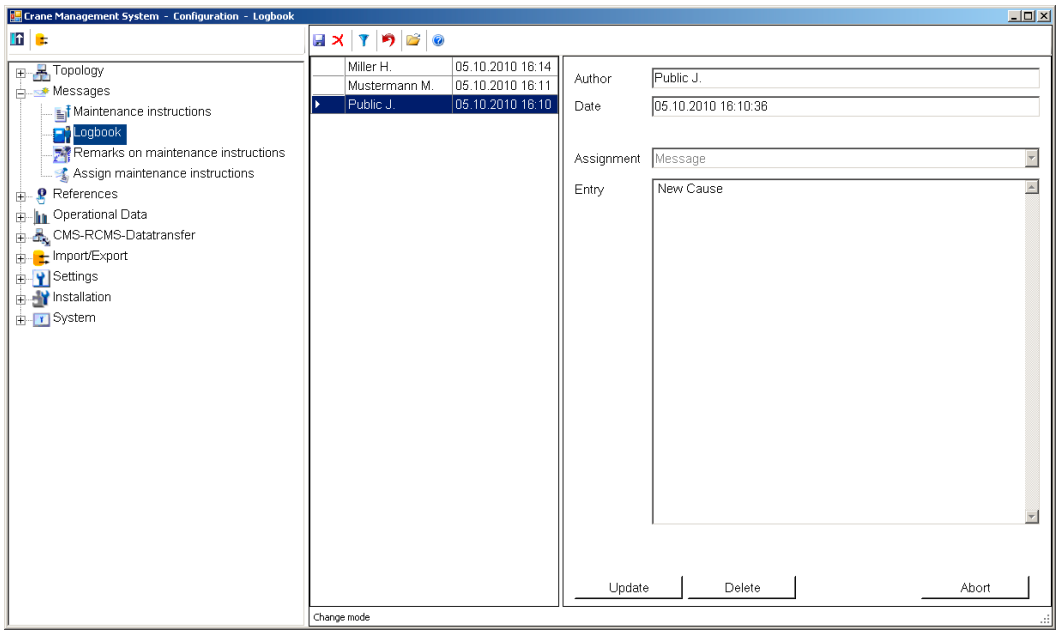


Figure 4-19 Logbook for maintenance instructions in the CMS editor

4.1.7.9 References in the CMS editor

Initial situation / objective

As well as being assigned to maintenance instructions, a message in the CMS editor can also be assigned various references. References are links between individual messages and different sources of information. In the event of a fault, the user directly calls a selected message from the context and therefore the information linked with it. For example, this can be a circuit diagram or an operating manual.

You must therefore provide the following information to a reference:

- Program to display the appropriate information (for example, Acrobat Reader to display a manual in the PDF format)
- Path and file name, under which the referenced information can be found, as well as special command line operators to the program (for example to open a specific page in the PDF)

A reference (e.g. a manual) that in principle can be assigned to several messages. However, it is possible that for message 1, page 5 in a PDF document is of interest, but for message 10, page 20 is of interest. By using macros as part of a reference call, you can define a wildcard for the page to be called. You only have to allocate a value to the wildcard if you assign a message to the reference.

You can define macros yourself:

- %Macroname%.

These are then entered into the macro list and managed in the dialog "Settings" → "Macros". In this dialog, you can assign a value to a macro, which is then valid at all locations where it is used.

In the CMS Editor there are also a few predefined macros; these contain system information, such as the installation path of the CMS.

You can use these macros. You cannot change the value.

As with maintenance instructions, there is an import function for the references. The CMS operating instructions contain a detailed description of this import function.

Processing steps

This example performed shows how to create a reference for a manual in PDF format.

Before you can create a reference, you first have to define the program to open it.

1. Open the dialog for defining programs under "Settings" → "Programs".
2. Enter any name for the program in the "Description" field (e.g. "Acrobat Reader 9.0").
3. Enter the program path of the program you want in the "Program" field.
4. On the program path, **you must** enter the predefined "%Reference%" macro as a wildcard for the document path. There must be a space between the path and the macro "%Reference%".

5. As an option, you can add other macros in the "Program" field.

   A macro of this type may be e.g. a wildcard for a particular page in a reference ("%Page%"). In this case the wildcard is part of a parameter instruction for the program which opens the page in the reference. You can find parameter instructions for opening programs in the documentation for the corresponding program. Enter the corresponding notation with the defined macro under "Program".

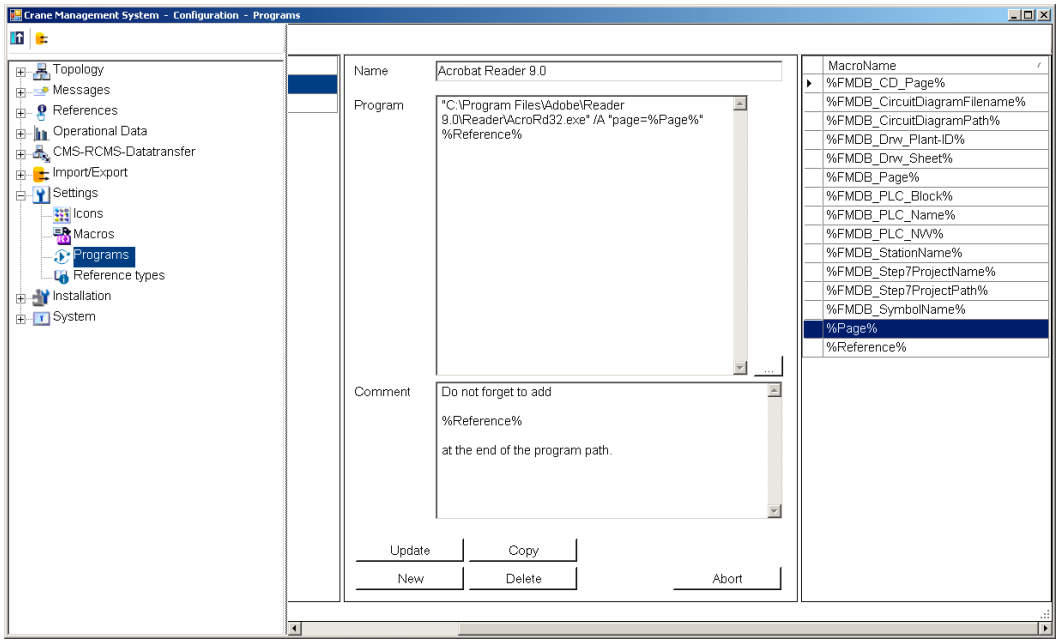


Figure 4-20 Configuring programs for opening references in the CMS editor

6. You can either enter a user-defined macro directly with the notation %Macroname% or first define it in the macro dialog under "Settings" → "Macros". If entering directly, when saving you are asked whether you want to transfer the macro to the list of macros or reject it.

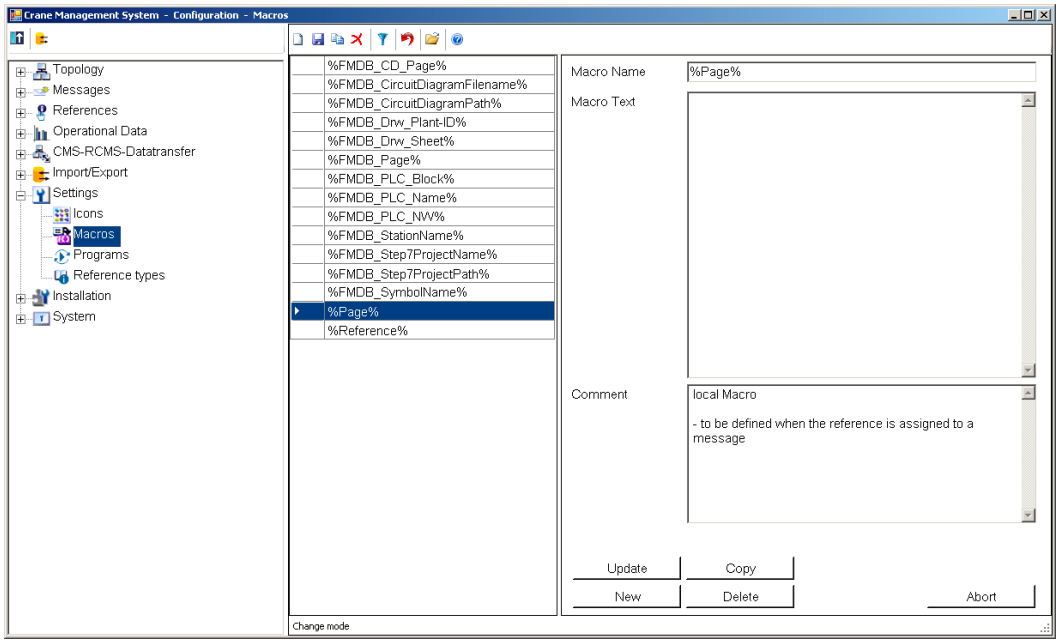


Figure 4-21 Configuring macros for opening references in the CMS editor

7. Open the reference dialog under "References" → "References".
8. Enter any name for the reference in the "Reference" field (e.g. "Manual").

9. Select the required program under "Program" (e.g. "Acrobat Reader 9.0").
10. Enter the path and name of the reference in the "Path" field (e.g. "E:\Helptext.pdf").

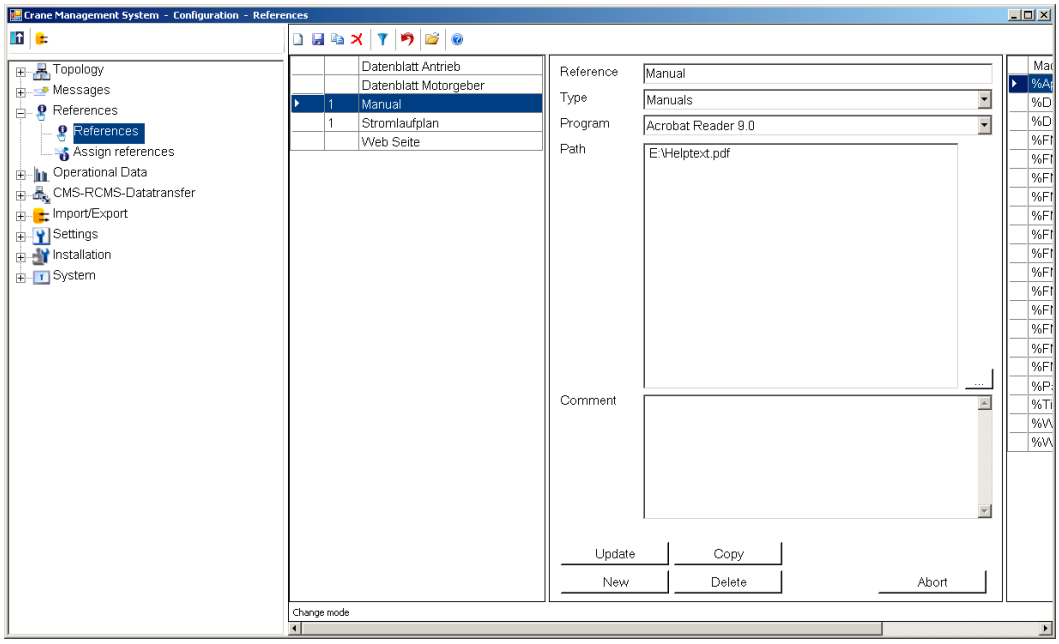


Figure 4-22 Configuring references in the CMS editor

As the last stage, you can assign the reference to any message:

1. Open the assignment dialog for references under "References" → "Assign references".

   The reference appears in the "References" list on the right. Here, it is also displayed as to how often a message is assigned to the reference.
2. Assign the reference to one or more messages.

3. You can assign a value (e.g. "5") to the "%Page%" previously defined as a wildcard for a page number.

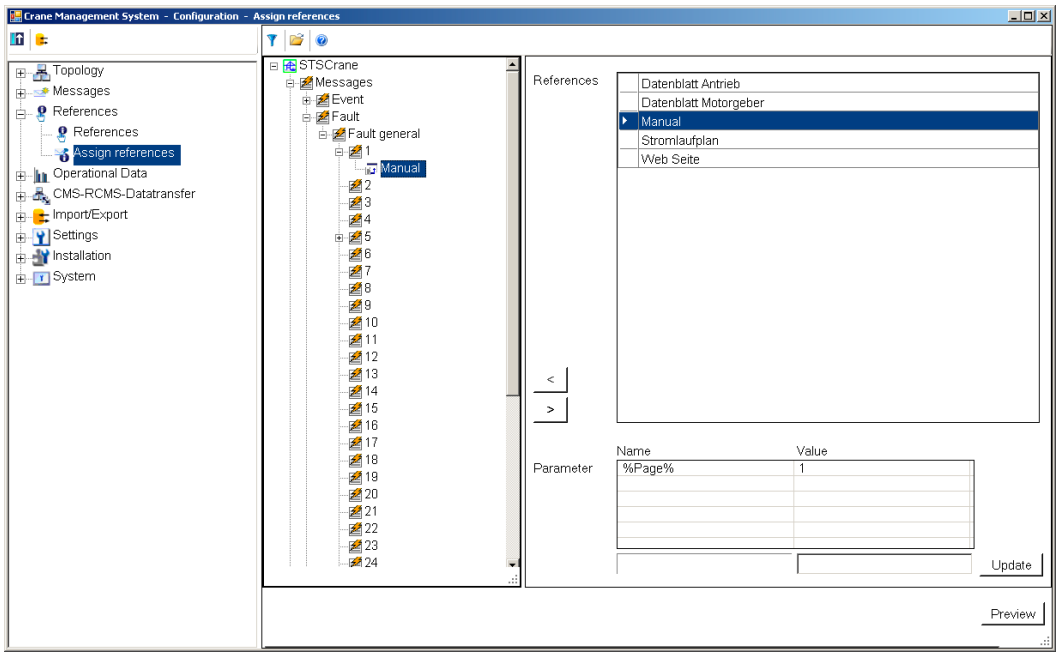


Figure 4-23 Assignment of references to a WinCC message in the CMS editor

4. Macros can be assigned a fixed value in the "Macro dialog" under "Settings" → "Macros". This also applies to "Global macros". Values are assigned in the "Macro text" field (e.g. "1" for the "%Page%" macro). The value then applies to all the reference's assignments. The value is however overwritten by entries in the "Parameter" field in the assignment dialog for references.

Result

In the example shown, you have configured a reference with parameters. Use the "Preview" button to test that the reference opens. The button simulates the runtime behavior.

If you have selected the topology "CMS with RCMS server", programs, macros, references or assignments as well as the associated entry are displayed as having been changed in the editor tree as soon as you have added new programs, macros or references or changed existing ones.

4.1.7.10 References according to STEP 7

Initial situation / objective

"PLC reference" is similar in function to the Win CC network jump. You can use PLC Reference either to open a STEP 7 block (FB, FC) and jump to a network there (network jump) or you can display the locations where a STEP 7 symbol is used. Use the corresponding call parameters to select between these two options.

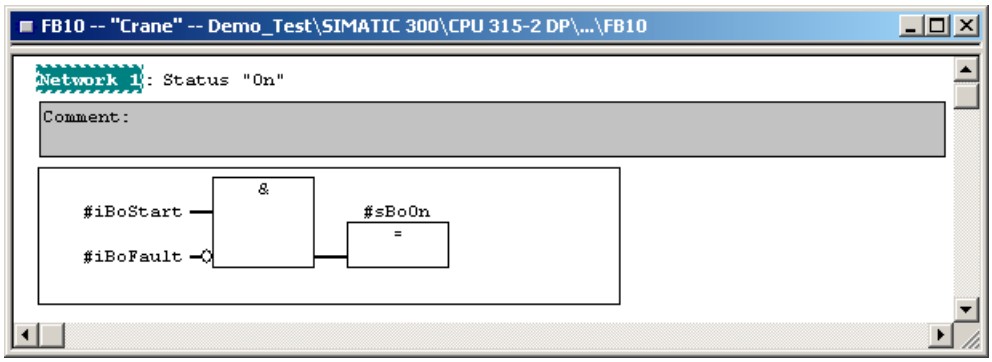


Figure 4-24 Network jump

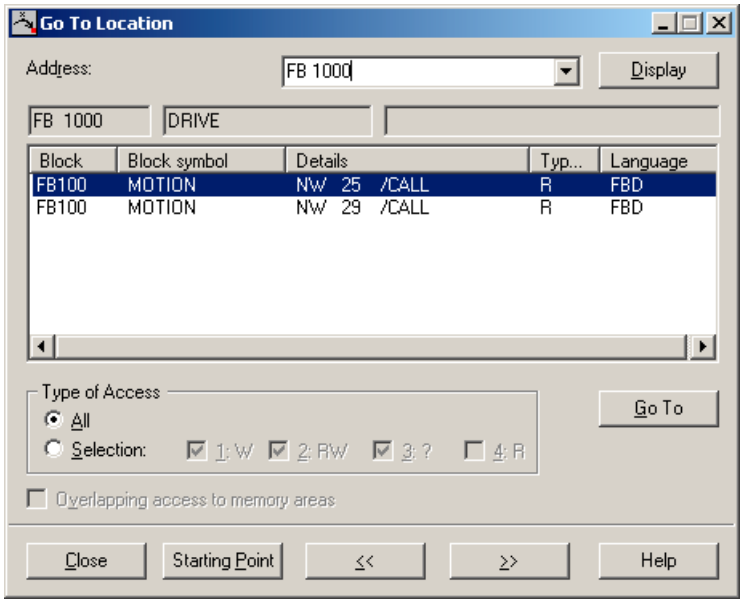


Figure 4-25 Points of use symbol

In order to initiate one of the two options from the user interface, you need to create a reference in the CMS editor. In principle, configuration is however based on creating a reference (see References in the CMS editor (Page 92)). Create the reference in the CMS editor once and reserve macros for message-specific parameters. PLC Reference requires a series of call parameters:

Table 4- 5 Call parameters for PLC Reference

Call parameters	Description	Network	Points of use
-p	Path on the STEP 7 project → p[ath] ("")	x	x
-st	Station name in the STEP 7 project → st[ation] ("")	x	x
-c	CPU name in the station → c[pu] ("")	x	x
-b	Name of a block in the CPU program → b[lock]	x	
-n	Network number in the block → n[etwork]	x	
-sy	Symbol name of a symbol in the symbol table in the STEP 7 program → sy[mbol]		x
-d	Data source name of WinCC database for error messages → D[SNName]	x	x

The PLC Reference program ("CMSPLCReference") is installed with SIMOCRANE CMS and is located in the SIMOCRANE CMS installation directory under …\WinCC\SIMOCRANE CMS\CMSPLCREFERENCE.exe. The program is based on SIMATIC STEP 7.

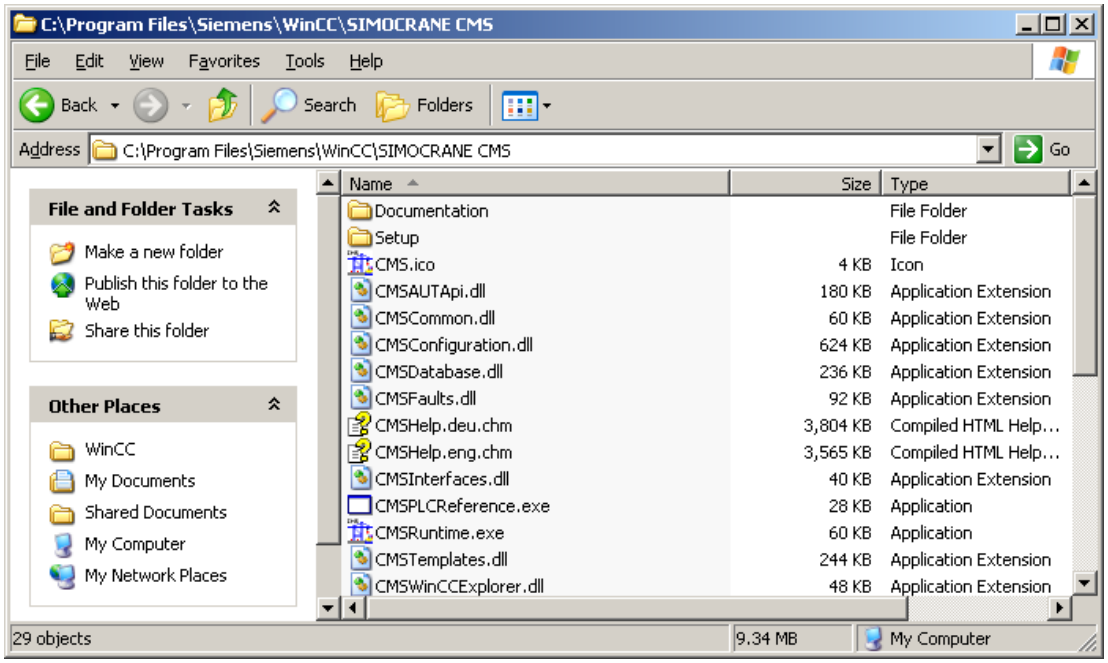


Figure 4-26 SIMOCRANE CMS installation directory

When installing SIMOCRANE CMS the "PLCReference" program is already predefined in the CMS editor.

You will find the predefined "PLCReference" program under "Settings" → "Programs". Here the path to the program is defined with the help of the %ApplicationPath% system macro. The macro provides the SIMOCRANE CMS installation path.

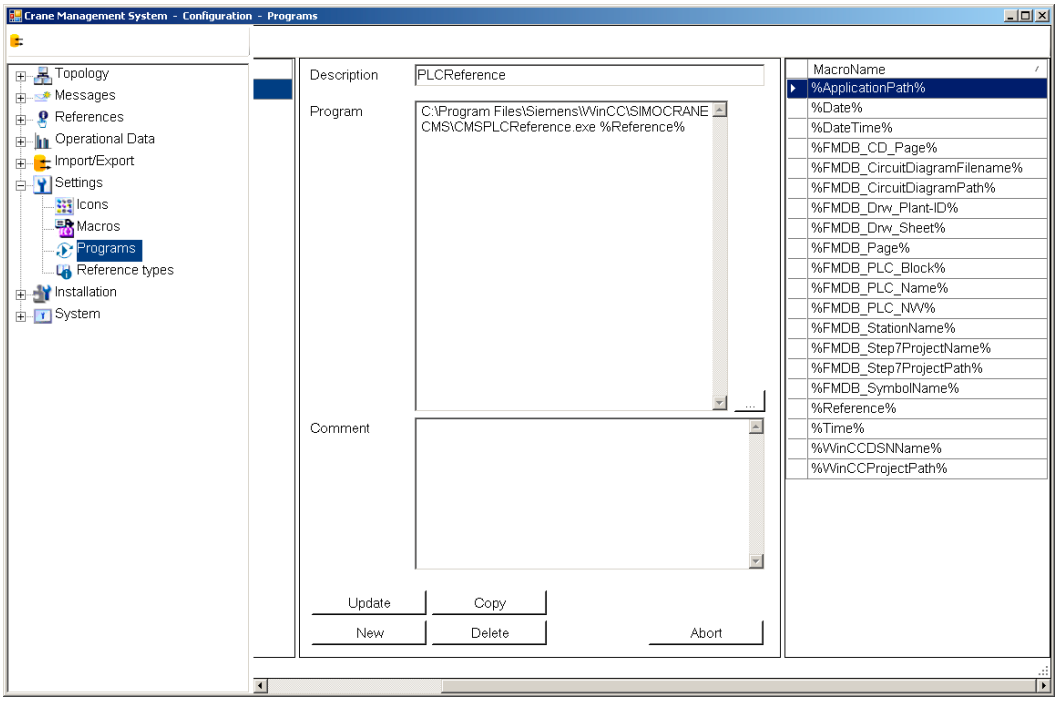


Figure 4-27 Predefined "PLCReference" program in the CMS editor

Processing steps

The example performed shows how to create the reference for the network jump.

1. Open the reference dialog under "References" → "References".
2. Enter any name for the reference in the "Reference" field (e.g. "STEP 7 Network").
3. Select the predefined "PLC Reference" program under "Program".
4. Enter the call parameters described with corresponding calls in the "Path" field, e.g.: –p "C:\Program Files\Siemens\Step7\S7Proj\Test\Test.s7p" –st "SIMATIC 300" –c "CPU 319F-3 PN/DP" –b FC1 –n 1 –d %WinCCDSNName%.

Note

Note the use of inverted commas in your parameters. Some parameters require inverted commas; however, in others, they must not be used (see Table 5-5).

Note

There must be exactly 1 space before and after each call parameter.

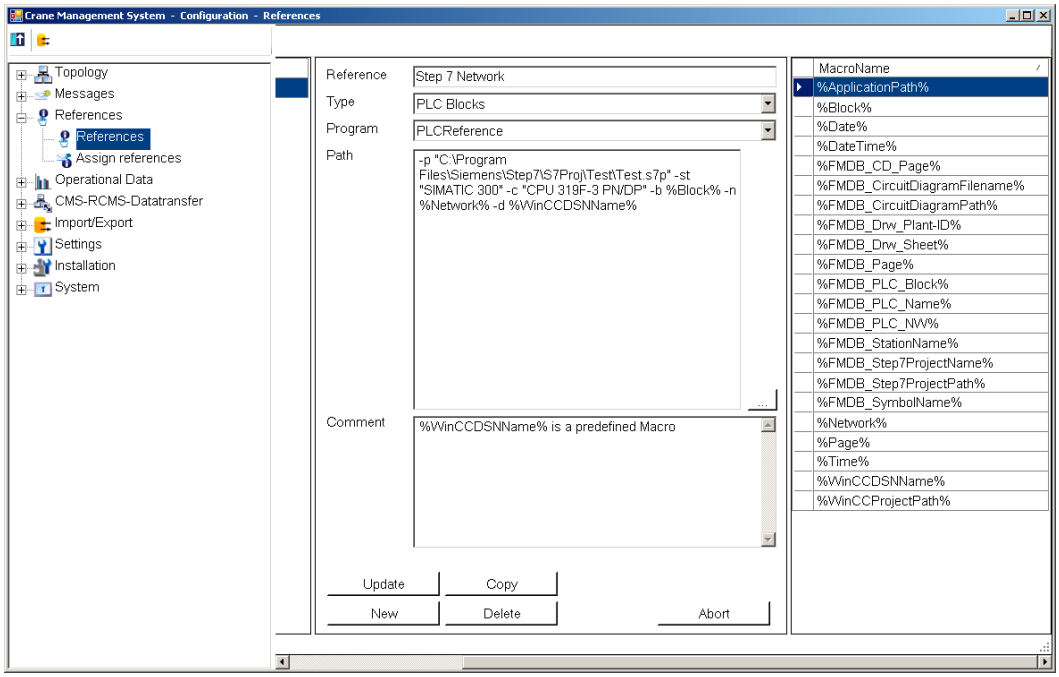


Figure 4-28 Creating the reference in the CMS editor

- You can also define a macro for each call parameter.
- You can assign macros a value when assigning the reference to a message, e.g. … "–b %Block%!…
- The data source name for WinCC error messages is provided in the %WinCCDSNName% system macro.

As the last stage, you can assign the reference to any message:

1. Open the assignment dialog for references under "References" → "Assign references".

   The "Step 7 Network" reference appears in the "References" list on the right.

2. Assign the reference to one or more messages.

   If you created a macro (e.g. "%Block%" as a wildcard for the block and "%Network" as a wildcard for the network) when defining the reference, you can assign a value to the macros in the "Parameter" field (e.g. %Block% = FC1 and %Network% = 1).

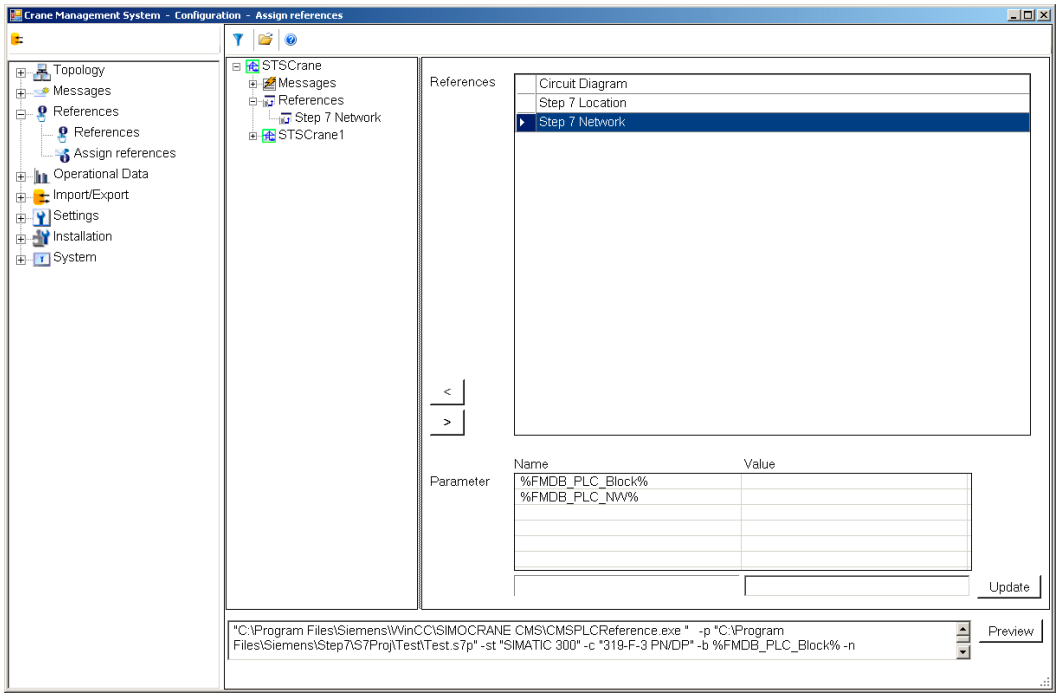


Figure 4-29 Assigning the reference, "Step7 Network" to a message

Result

In the example shown, you have configured the "Step7 Network" reference. Use the "Preview" button under "References" → "Assign references" to test that the reference opens. The button simulates the runtime behavior.

Note

Check the use of inverted commas in your program call.

If you have selected the topology "CMS with RCMS server", programs, macros, references or assignments as well as the associated entry are displayed as having been changed in the editor tree as soon as you have added new programs, macros or references or changed existing ones.

4.1.8 Operational data on the CMS station

CMS Runtime records three categories of operational data for a crane:

- Cargo handling data
- Time slices for counter values (operating hours, load and switching cycle counters)
- MMBF data

Each category contains a configurable data set. The data sets are entered in the WinCC Tag Logging archives by the CMS Runtime, depending on the event. The background to event control is that all values can be entered in the archive in synch with a defined time stamp and accessed as a data package for this time stamp later on.

Events include:

- cyclic events
- acyclic events (trigger tag, change in value)

The values entered can be called up in WinCC directly using the WinCC Table Control and displayed in tabular form.

The following steps should be followed for configuration:

- Configuring the data sets in WinCC
- Configuration of types of recording/recording events in the CMS editor

4.1.8.1 Data sets for configuring operational data

Initial situation

The data sets are configured in WinCC.

One data set comprises several WinCC process tags, which are archived in a common WinCC Tag Logging archive.

You will find the following data sets configured in the standard application.

Table 4- 6 Operational data sets in the CMS standard application

Category	Tag group for process tags	WinCC Tag Logging archive	WinCC screen	Description
Cargo handling data	MoveData	MoveData	MoveData	Cargo handling data set
MMBF data	MMBFData	MMBFData	MMBFData	MMBF data set
Time slices for counter values	CounterTotal	CounterHourly	-	Data set for load and maintenance counters
	CounterTotal	TimerDaily	-	Data set for operating hours counter

NOTICE
The length of the archive name is limited to 32 characters, the length of the process tag name is limited to 64 characters. Here, note that when transferring configuration data to an RCMS server, the archive names and the process tag names have the crane name as prefix, followed by "_". The total number of characters at the RCMS specified above must not be exceeded.

In the following, the cargo handling data archive is used to describe how you can extend an existing data set.

Processing steps

1. First of all, create all the new values of the data set as process tags in the tag group "MoveData", in the WinCC tag management.
2. Add the new process tags in the WinCC Tag Logging archive "MoveData", or remove values you do not need.
3. Open the properties of the new archive tags.
4. Because the values from the CMS Runtime are subsequently entered in the archive, you need to define the following properties:

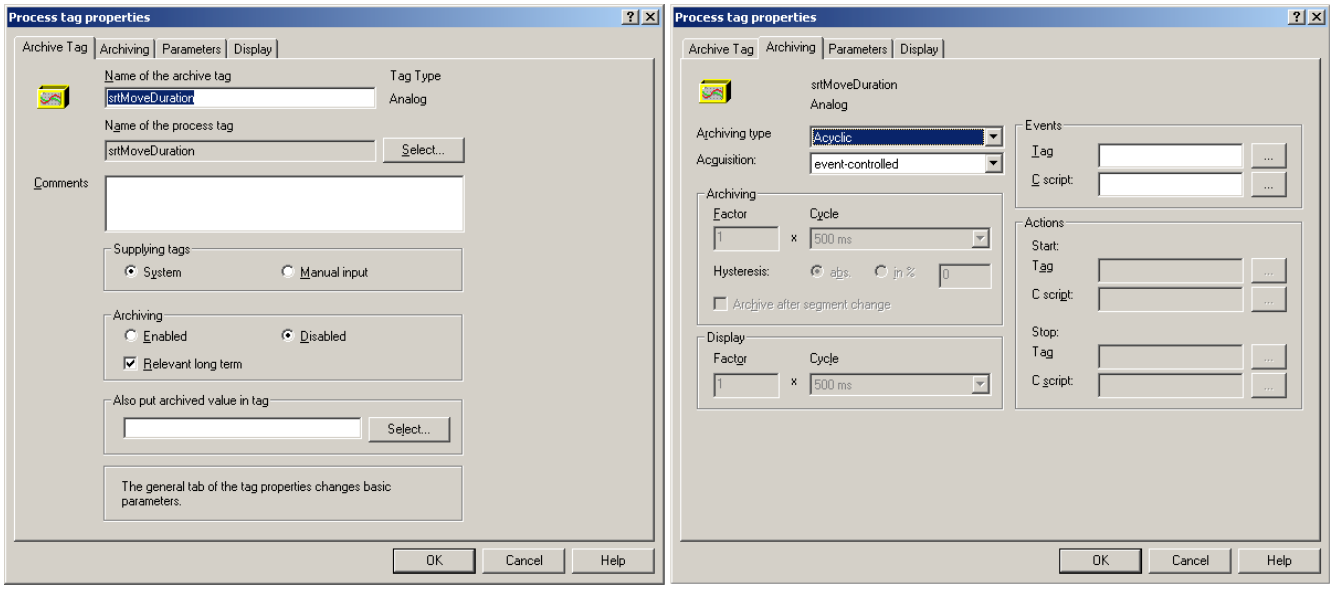


Figure 4-30 Configuration of archive tags for recording cargo handling data in the WinCC Tag Logging editor

Table 4- 7 Setting for archive tags for recording operational data

Tab	Option	Setting
Archive tag	Archiving	Disabled
Archiving	Archiving type	Acyclic
Archiving	Acquisition	Event-controlled
Archiving	Events	No entry

- Proceed in the same way for all other data sets which you wish to change.
- You can also define your own archive. Proceed as described above when configuring the archive.

Result

You have now prepared the operational data sets. However, at the moment you cannot record any values. To do this, you must configure the next recording steps in the CMS editor. The recording dialog differentiates between the three operational data categories.

4.1.8.2 Acquiring cargo handling data

Initial situation / objective

Acquiring cargo handling data with the CMS Runtime means reading a data set associated with a cargo handling operation and entering it into a WinCC Tag Logging archive with a common time stamp. All the data of the cargo handling data set to be recorded must be present as tags in the WinCC tag management and be defined in an archive of the WinCC Tag Logging editor. All the data must be in the same archive. Trigger tags initiate data recording.

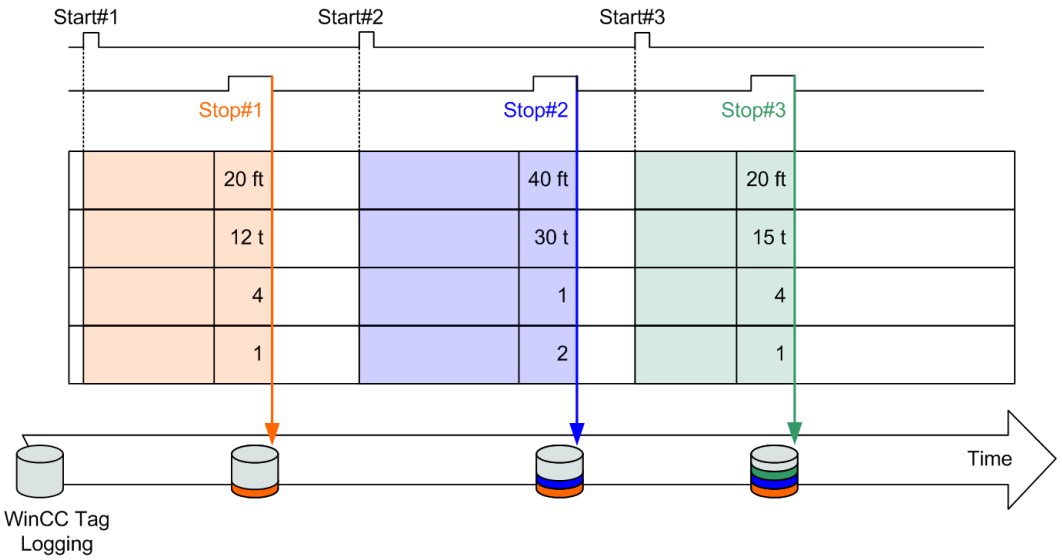


Figure 4-31 Acquiring cargo handling data

The following types of cargo handling data recording are supported by the CMS Runtime:

- Direct recording:

  The data set time stamp is generated in the CMS. A start and stop event define the time frame of the data set. The data is read during the stop event. The start and stop events are binary tags in the WinCC tag management. If the value is "1", then the CMS Runtime reads information and resets the tag to "0". The start time stamp is determined during the start event and during the stop event the stop time stamp is determined, the cargo handling data is read and entered into the WinCC Tag Logging archive. The stop event may only be set to "1" if the start event has already been reset to "0".

- Buffered recording:

  The time stamp of the data set is generated on the controller and transferred to the CMS with the data set. The mechanism supports the buffering of data on the controller. The time stamp is always transferred from the controller to WinCC split up into individual time components (year, month, day, hour, minute, second). The time components must be defined as tags in the WinCC tag management and written by the controller along with the data set. Time components are byte type tags. The CMS add-on expects and interprets a time stamp with decimal coding on a time basis of 24 hours. A trigger tag from the WinCC tag management uses the "1" status to signal that a new data set can be read. The CMS Runtime sets the status to "0" when the data has been read and entered in the Tag Logging archive. A new data set can now be written on the controller.

  Note

  For the trigger control, it is essential you observe the information in the operating instructions of the CMS add-on for WinCC.

The following criteria are already fulfilled in the CMS standard application:

- Process tags for the cargo handling data set in the tag group "MoveData".
- Trigger tags in the tag group "MoveData"
- Time stamp tags in the tag group "MoveData"
- Tag Logging archive "MoveData" for saving the data sets
- WinCC screen "MoveData.Pdl" for displaying the data sets in a WinCC OnlineTableControl.

How to configure the recording using CMS Runtime is described below.

Processing steps – direct recording

1. Open the CMS editor.
2. Open the cargo handling data dialog under "Operational data" → "Cargo handling data".
3. Enter the name of the predefined WinCC Tag Logging archive in the "Archive" field (e.g."MoveData").

The "Trigger" and "Time stamp" fields define the type of data recording. You must note the following for the direct recording of data:

1. In the "Start" field, enter the WinCC process tag "blnMoveStart" from the tag group "MoveData", which signals the start of the cargo handling operation.

2. In the "Stop" field, enter the WinCC process tag "blnMoveStop" from the tag group "MoveData", which signals the end of the cargo handling operation.
3. The fields for "Time stamp" must remain empty.
4. An internal WinCC tag for the cargo handling duration is entered in the "Duration" field. The duration is calculated by the CMS Runtime.
5. Data acquisition is activated with the "Record data" setting. If you remove the check mark, you can shut down the complete processing. No data is transferred and no archive entries or XML files are created.

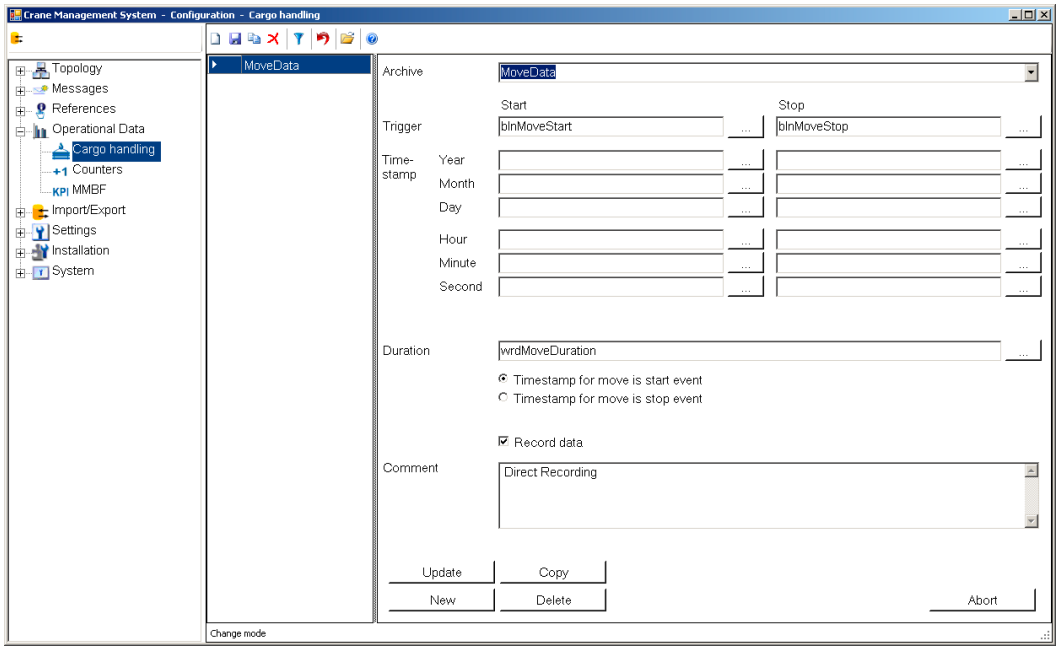


Figure 4-32 Configuration of direct cargo handling data recording in the CMS editor

Processing steps – buffered recording

1. Open the CMS editor.
2. Open the cargo handling data dialog under "Operational data" → "Cargo handling data".
3. Enter the name of the predefined WinCC Tag Logging archive in the "Archive" field (e.g."MoveData").

   The "Trigger" and "Time stamp" fields define the type of data recording. You must note the following for the recording of data with backup:
4. The "Start" field may remain empty. Otherwise, enter the WinCC process tag "blnMoveStart" from the tag group "MoveData" in this field.
5. In the "Stop" field, enter the WinCC process tag "blnMoveStop" from the tag group "MoveData". This signalizes that a data set can be read.
6. Enter the respective tags for the time components for the start time in the "Time stamp" → "Start" fields.

7. Enter the respective tags for the time components for the stop time in the "Time stamp" → "Stop" fields.

   An internal WinCC tag for the cargo handling duration is entered in the "Duration" field.

8. The duration is calculated by the CMS Runtime. When recording with backup you can also send the "Duration" rather than the stop time from the controller.

   Data acquisition is activated with the "Record data" setting. If you remove the check mark, you can shut down the complete processing. No data is transferred and no archive entries or XML files are created.

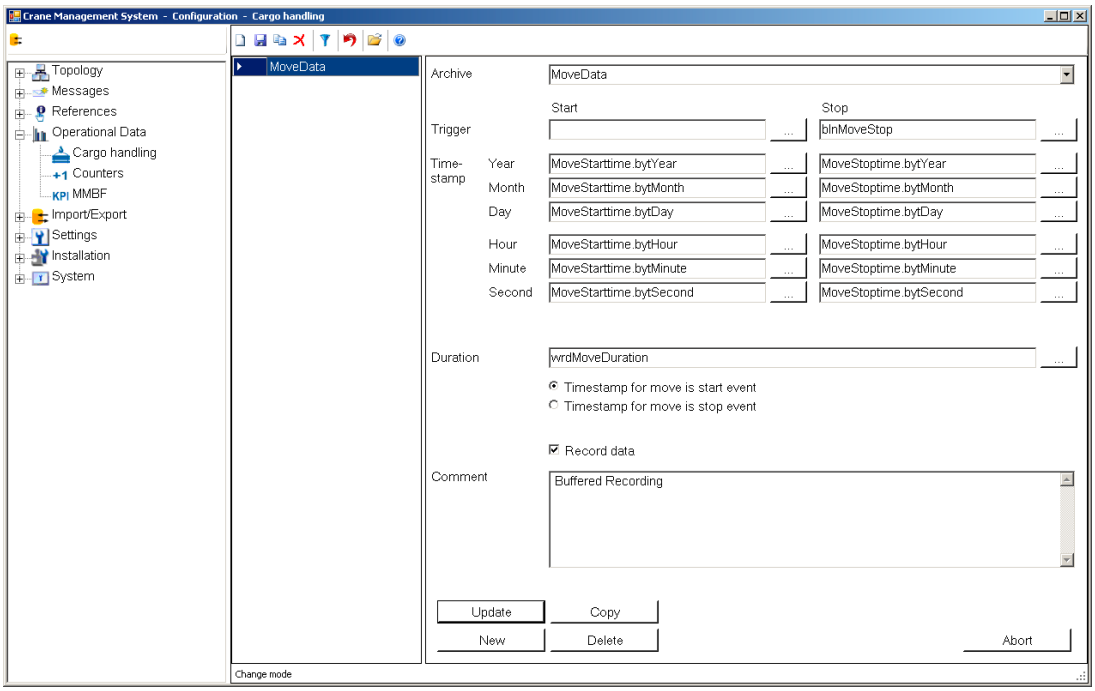


Figure 4-33 Configuration of buffered cargo handling data recording in the CMS editor

If you selected the topology "CMS with RCMS server", then your cargo handling data archive and the associated entry is shown in the editor tree as changed. Further, your archive with all process values is displayed in the dialog CMS-RCMS data transfer → Transfer operational data.

4.1.8.3 Recording time slices for counter values

Initial situation / objective

The standard application makes a distinction between two types of counter:

- Total counter: Counter for measuring a crane's service life (equivalent to a total kilometer reading in a car)
- Section counter: Counter which can be reset from the CMS user interface (similar to a trip recorder in a car)

The actual counters are located on the crane controller. Both counters must count in tandem. Their current value is defined as a tag in the WinCC tag management. A bit in the CMS user interface triggers the resetting of the section counters on the controller.

Use the following naming convention in the WinCC tag management to make an assignment between a total counter and a section counter:

- Total counter: → "Counter name"
- Section counter to "Counter name": → "Counter nameRes"

This means you will not be able to create a total counter with the ending "Res".

The CMS Runtime handles two tasks for the counter values:

- Calculating differential values for a total counter in defined time slices
- Monitoring counters' current values. The CMS runtime monitors the consistency of all total counter values and the assigned section counters. (Note the naming convention!)

You can define any time slices in the CMS editor. The time slices are stored in WinCC Tag Logging archives. A time slice applies to all values in an archive.

A counter's current values can only be monitored if the total counter is part of an archive dedicated to recording time slices in the CMS editor. The section counter must not be part of the archive. When the value of a total counter changes, the current value is compared with the last counter value stored. If the current value is less than the value last stored, the CMS writes the old value back to the controller. This prevents information from being lost, something which may occur if the control program is reloaded to the CPU after a certain operating time.

Note

A configuration file is created in the WinCC project directory under "…\CMS\Counter" and under "…\CMS\Accumulates" to monitor the counter values and to calculate the difference. If the counter values are to be deleted in full, these two configuration files must be removed.

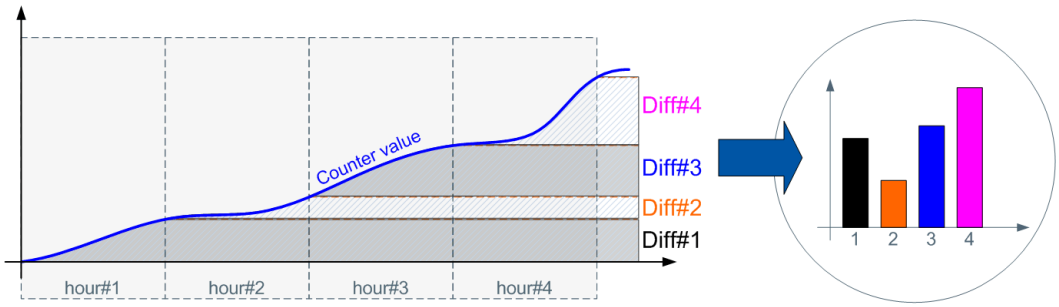


Figure 4-34 Recording time slices for counter values

In the standard application, the process tags for the controller's total counter are available in the tag group "Counter_Total", the resettable counters are available in the tag group "Counter_Reset".

Two tag logging archives, "CounterHourly" and "CounterDaily", have been set up to save the time slices.

The following criteria are already fulfilled in the CMS standard application:

- Process tags in the tag group "Counter_Total.
- Tag logging archives "CounterHourly" and "CounterDaily" for saving the data sets

The following describes how to configure that the time slices for counter values are recorded in the CMS editor. The counter restoration is coupled to the recording of the counter values.

Processing steps

1. Open the CMS editor.
2. Open the counter dialog under "Operational data" → "Counters".
3. Enter the name of one of the predefined WinCC Tag Logging archives in the "Archive" field (e.g."CounterHourly").
4. Select the recording cycle you want under "Cycle". The following options are available:
   - Hourly
   - Daily
   - Weekly
   - Monthly

5. Enter the time for initializing the values under "First start".

   You can use the setting "Switch off processing" to switch off the processing completely. No data is transferred and no archive entries or XML files are created.

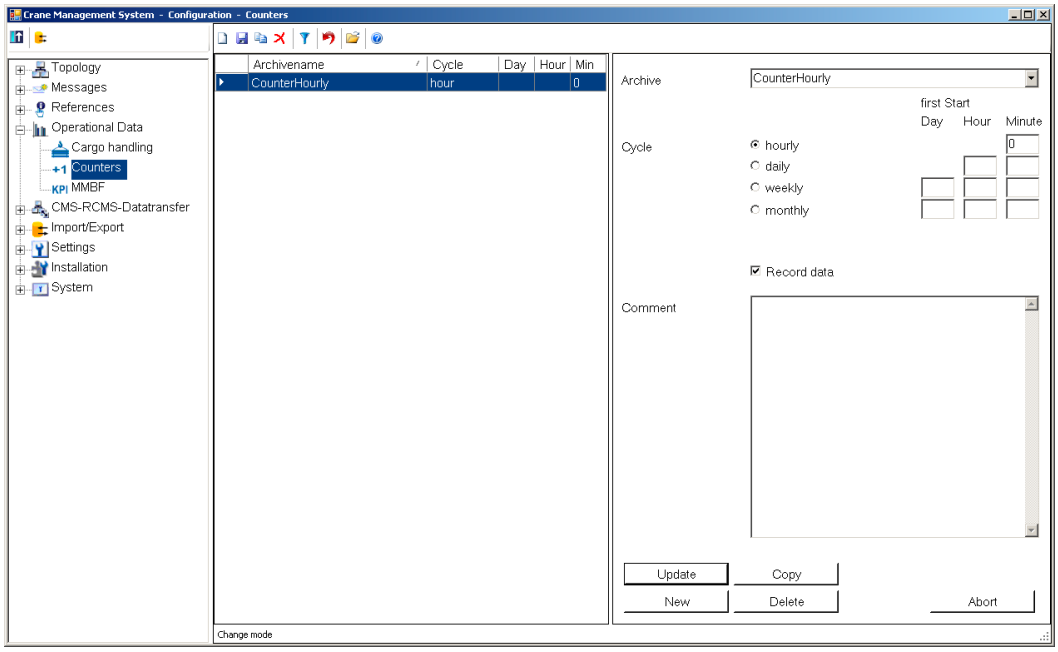


Figure 4-35 Configuring the recording of counter data in the CMS editor

6. Use "New" to create an additional data set and configure the recording for all other counter time slice archives (e.g. "CounterDaily") as described above.

   If you selected the topology "CMS with RCMS server", then your counter archive and the associated entry is shown in the editor tree as changed. Further, your archives with all process values are displayed in the dialog CMS-RCMS data transfer → Transfer operational data.

Note

Please note that for the initial start, a value initialization must be carried out first. Therefore no values are entered in the archive for the first cycle.

4.1.8.4 Recording MMBF data

Initial situation

The CMS Runtime can record what is known as MMBF data which is determined on the controller and configured in the WinCC Tag Logging. The process of reading a MMBF data set is signaled to the CMS Runtime by the controller using a trigger tag. If the trigger tag value is "1", the CMS Runtime reads information, enters the data in a WinCC Tag Logging archive and resets the tag to "0".

As with cargo handling data, the CMS Runtime supports the following types of MMBF data recording:

- Direct recording

  The data set time stamp is generated in the CMS.

- Recording with backup

  The time stamp at which the data set was determined on the controller is also set on the controller and transferred to the CMS along with the data set. The mechanism supports the buffering of data on the controller.

The following criteria are already fulfilled in the CMS standard application:

- Process tags in the tag group "MmbfData"
- Trigger tags in the tag group "MmbfData"
- Time stamp tags in the tag group "MmbfData"
- Tag Logging archive "MmbfData" for saving the data sets

The description below explains how you adapt the existing data set or type of recording to your requirements.

Processing steps – direct recording

1. Open the CMS editor.

2. Open the MMBF data dialog under "Operational data" → "MMBF data".
3. Enter the trigger tag for reading the MMBF data set in the "Trigger" field.

   The "Time stamp" fields define the type of data recording. You must note the following for the direct recording of data:

   – The fields for "Time stamp" must remain empty.

   – Data acquisition is activated with the "Record data" setting. If you remove the check mark, you can shut down the complete processing. No data is transferred and no archive entries or XML files are created.

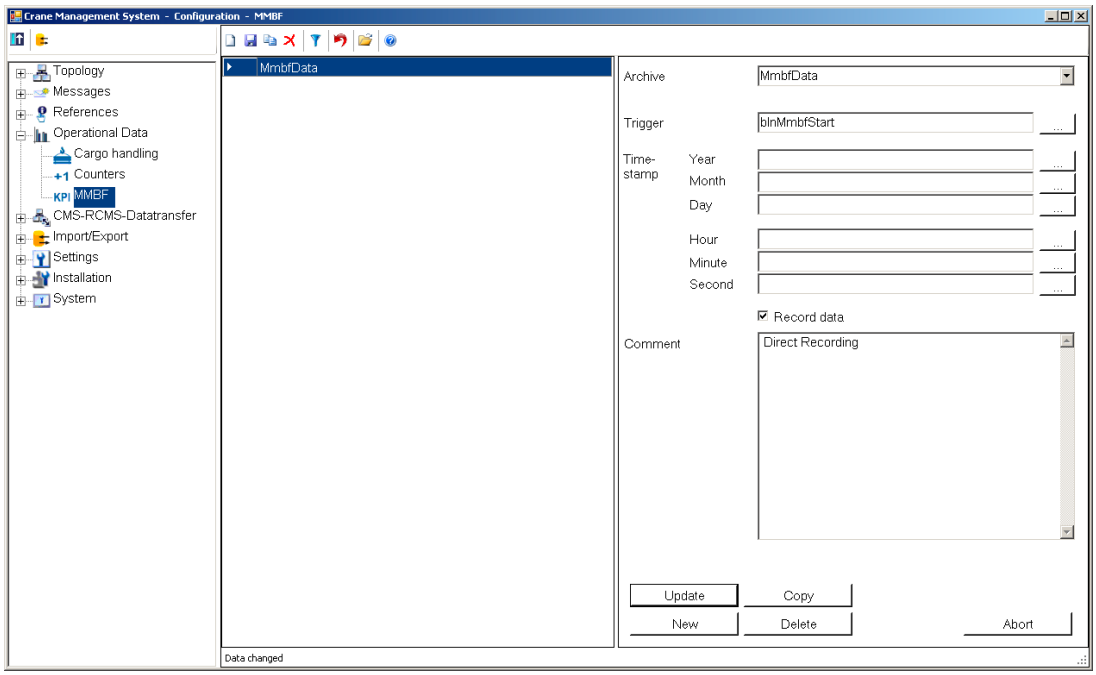


Figure 4-36 Configuration of direct MMBF data recording in the CMS editor

Processing steps – buffered recording

1. Open the CMS editor.
2. Open the MMBF data dialog under "Operational data" → "MMBF data".
3. Enter the trigger tag for reading the MMBF data set in the "Trigger" field.

   The "Time stamp" fields define the type of data recording. You must note the following for the recording of buffered data:
4. Enter the tags for the time components for the time stamp in the "Time stamp" fields.

   Data acquisition is activated with the "Record data" setting. If you remove the check mark, you can shut down the complete processing. No data is transferred and no archive entries or XML files are created.

   If you selected the topology "CMS with RCMS server", then your MMBF data archive and the associated entry are shown in the editor tree as changed. Further, your archive with all process values is displayed in the dialog CMS-RCMS Data Transfer → Transfer operational data.

4.1.9 Integrating web-based documentation

Initial situation / objective

The CMS standard application provides an example of web-based documentation in the "Documentation" menu. This only contains a few sample documents. You can integrate any number of your own pieces of documentation. Note the following information.

Processing steps

1. Produce web-based documentation, and name the start page "index.htm".
2. Open the folder for the web-based documentation in the "…\CMS\CMS_Documentation" project directory.
3. Delete the entire contents of the "CMS_Documentation" folder.
4. Copy your web-based documentation into the "CMS_Documentation" folder
5. Ensure that the "index.htm" start page is in the folder.
6. Check the accessing of documentation in the CMS standard application, "Documentation" menu.

Result

The web-based documentation that you have produced is displayed in the CMS standard application.

4.1.10 Communication with the RCMS server

4.1.10.1 Set up communication

You will have defined the communication parameters for the CMS station in the CMS editor under "Topology" → "Cranes".

Data exchange of configuration data and runtime data is carried out by the CMS Runtime of the CMS station and the CMS Runtime of the RCMS server.

On the CMS station, the following requirements must be met for communication:

- Accessibility of the RCMS server via TCP/IP
- CMS Runtime active
- Parameterization of the CMS station as "CMS with RCMS server" in the CMS editor → Basic settings → Topology
- Definition of the crane as CMS station in the CMS editor (Topology → Cranes) with at least the following communication parameters:
  - Crane name
  - Equipment type
  - Computer name
  - IP address
  - Port
  - "Crane is synchronized with RCMS" option is selected
- Setting up the communication on the RCMS server (see Chapter Communication between the RCMS server and the CMS stations (Page 152))

WinCC Runtime must also be active to transfer runtime data.

You can read the state of the communication from the CMS system tag "@CMSConnectionState". This tag has the following states:

Bit	Description
0	When starting CMS Runtime, no major errors occurred. All local functions are active. There is no connection to the RCMS server.
1	When starting CMS Runtime, no major errors occurred. All local functions are active. The connection to the RCMS server is active.
7	CMS Runtime cannot run. When starting CMS Runtime, a fault has occurred that prevents CMS Runtime from being executed (e.g. WinCC Runtime has not been started, a crane has not been defined in the CMS editor, a wrong computer name has been entered into the CMS editor, ...). You can find more information on this fault in the CMS error file in the folder …\CMS of the WinCC project directory.

4.1.10.2 Data interface for operational data and messages

During transfer of CMS-RCMS Runtime data, operational data, messages and tag values are transferred from the CMS station to the RCMS server.

There is an additional XML data interface for transferring operational data and messages.

The XML files are stored in corresponding transfer directories, parallel to archiving in WinCC. The CMS Runtime handles the creation of the files.

Note

The files are not read out of the archive, but written in the XML files parallel to archiving.

The transfer directories are automatically created in the <<Project path>>\"CMS" sub-folder of the WinCC project directory.

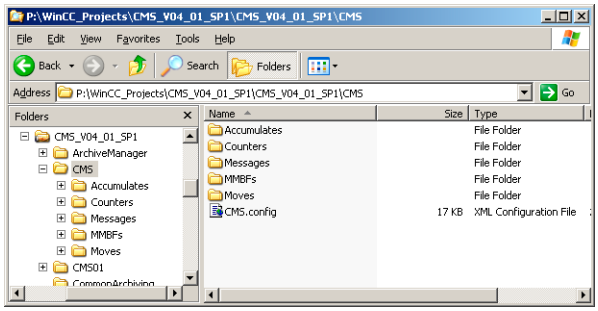


Figure 4-37 Transfer directories for XML files

Directory name	Description
Accumulates	Contains files for transferring differences in counter values.
MMBFs	Contains files for transferring the MMBF data.
Moves	Contains files for transferring the cargo handling data.
Messages	Contains files for transferring the WinCC error messages.

Each transfer directory has the following directory structure:

The files to be transferred are located in the "Files" folder. Files where errors occurred when they were being transferred are in the "Errors" folder. For Accumulates, there is also the "Init" folder. It contains a bin file, which is internally used to calculate the difference of counter values.

The files of a day are combined in the directories "Files" and "Errors" in a subdirectory. The directory name is generated from the ISO date (yyyy-mm-dd).

The name of the transfer files is taken from the time stamp (UTC) and the data type is generated, e.g.
Messages.2008-11-21_12-00-00.000.1.XML

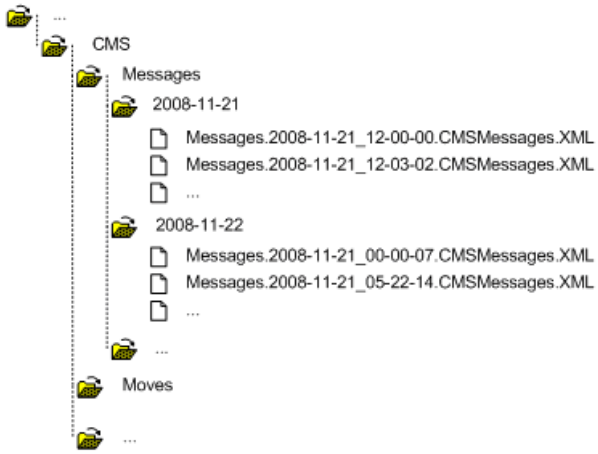


Figure 4-38 Structure of the CMS-RCMS transfer directory (XML interface)

If a file has been transferred from the CMS station to the RCMS server, the files are deleted from the transfer directory. If a file cannot be transferred due to an error, the corresponding file is moved into the "Errors" error directory.

Note

Please note that there are setting options for switching off the runtime data transfer in the CMS editor, in the screens for the cargo handling data, MMBF data and counter value recording.

Note

You can set after how many hours the accumulated XML files are to be deleted under System → Basic settings → Computer in the CMS editor. Old files in the transfer directories are deleted, as well as the files in the error directories.

Further, here you can set the minimum amount of memory that should remain free.

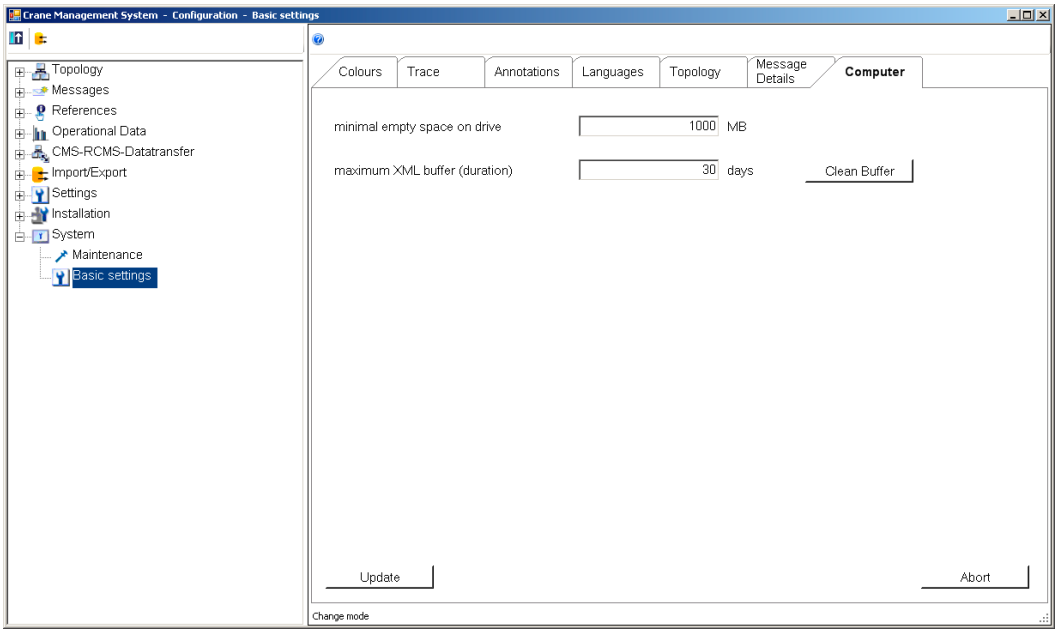


Figure 4-39 Limiting the disk space used in the CMS editor

4.1.10.3 Transferring messages

Initial situation / objective

You can disable the transfer of messages to the RCMS server.

Processing steps

1. In the CMS editor, open the dialog CMS-RCMS Data Transfer → Messages.

   All of the message classes configured in the WinCC Alarm Logging of the CMS station are shown in the upper section.

2. Set the check mark "Configuration" for each class whose messages are to be generated in the WinCC Alarm Logging of the RCMS server.

3. Set the check mark "Runtime" for each class whose messages should be transferred in Runtime to the RCMS server.

   You can only activate the check mark "Runtime" if the check mark "Configuration" has been set.

4. Select a class (e.g. "Fault") for which you have set both check marks.
   - The messages belonging to this class are shown in the lower section of the dialog.
   - For each message, using the check mark "Configuration", you can select whether this message should be generated in the archive of the RCMS server – or not.
   - As soon as you have set the check mark "Configuration" for the message class, then initially, it is also set for all of the associated messages.
   - At each message, using the check mark "Runtime", you can select whether they should be transferred in runtime – or not.
   - As soon as you have set the check mark "Runtime" for the class, then initially, it is also set for all of the associated messages.

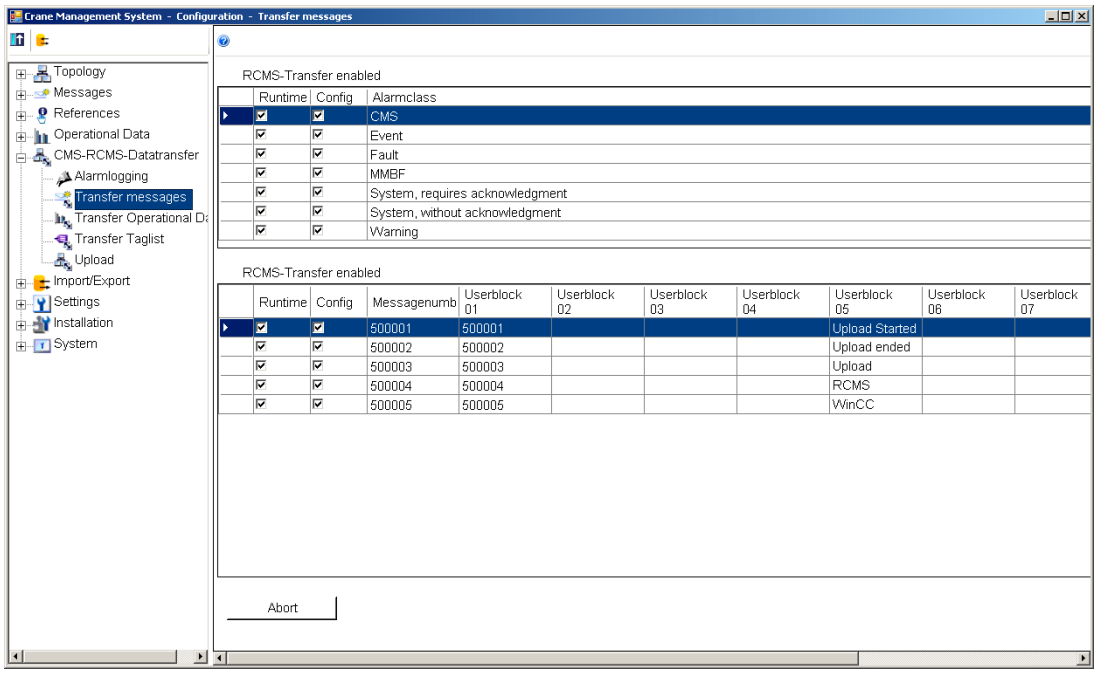


Figure 4-40 Transferring messages

4.1.10.4 Transferring operational data

Initial situation / objective

You can disable the transfer of operational data to the RCMS server.

Processing steps

1. In the CMS editor, open the dialog CMS-RCMS Data Transfer → Operational data.

   The WinCC Tag Logging archives are shown in the upper section, which are configured in the CMS editor of the CMS station in the operational data dialogs (cargo handling data, counters, MMBF data).

2. Set the check mark "Configuration" for each archive whose archive tags are to be generated in the WinCC Tag Logging of the RCMS server.

3. Set the check mark "Runtime" for each archive whose archive values should be transferred in runtime to the RCMS server.

   You can only activate the check mark "Runtime" if the check mark "Configuration" has been set.

4. Select an archive (e.g. "MoveData") for which you have set both check marks.
   - The archive tags belonging to this archive are shown in the lower section of the dialog.
   - For each archived tag, using the check mark "Configuration", you can select whether this tag should be generated in the archive of the RCMS server – or not.
   - As soon as the check mark "Configuration" is set for the archive, then initially, it is also set for all associated archive tags.
   - For each archive tag, using the check mark "Runtime", you can select whether the values of a tag should be transferred in runtime – or not.
   - As soon as you have set the check mark "Runtime" for archive, then initially, it is also set for all associated archive tags.

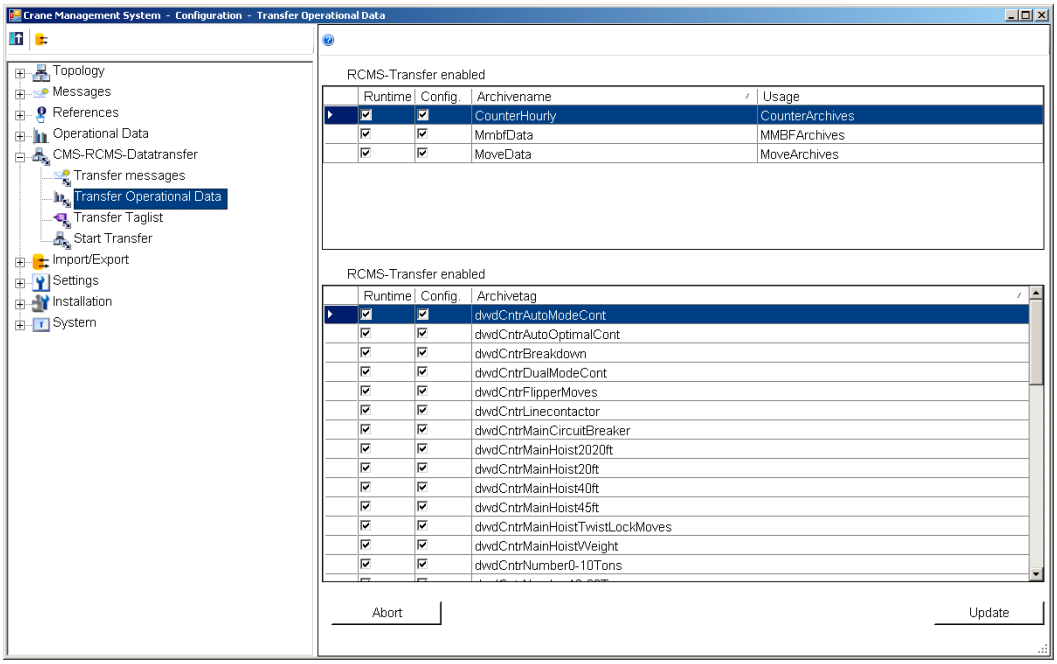


Figure 4-41 Transferring operational data

4.1.10.5 Transferring tag values

Initial situation / objective

Tags, whose values are to be transferred to the RCMS server, must be defined in the taglist in the CMS editor:

- Counter values for evaluations in the downtime monitor
- Other status information

At the CMS station, you can enter any individual tags into this taglist.

Note

CMS system tags ("@CMS ... ") are automatically created in the taglist.

Processing steps – manual configuration

1. Open the CMS editor under "CMS-RCMS Data Transfer" → "Transfer taglist".

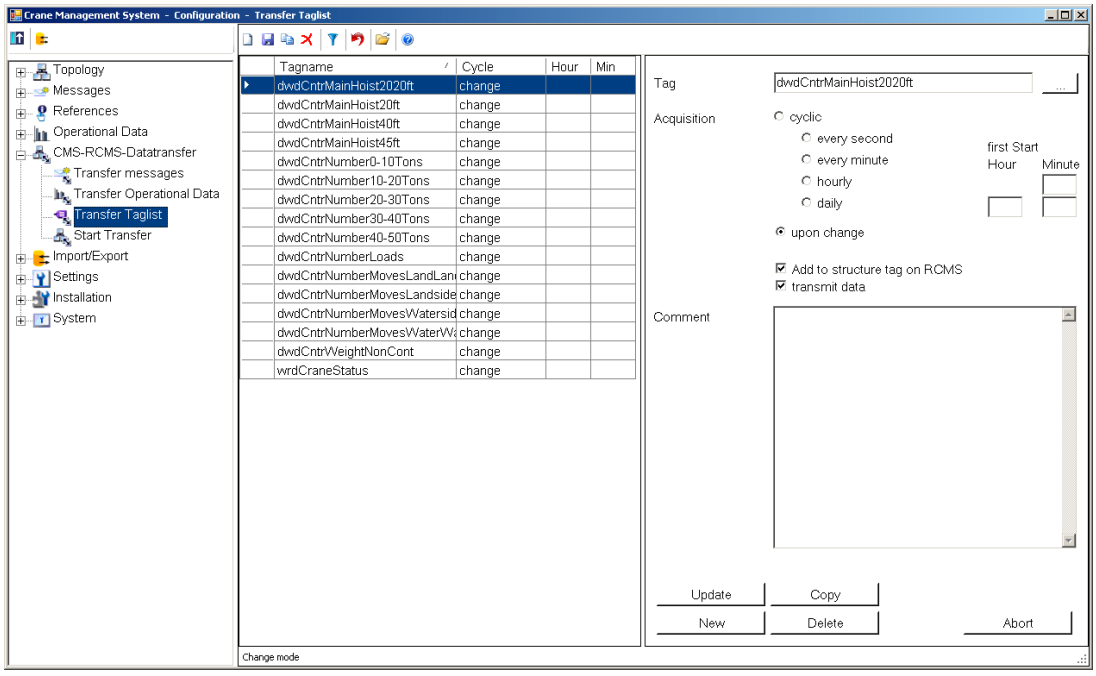


Figure 4-42 Taglist on the CMS station

2. Using the selection dialog in the "Tag" field, you can select individual tags in the WinCC tag management.
3. You can set the tag recording cycle under "Acquisition". You can choose between cyclic and acyclic recording. Note that any acyclic data acquisition ("upon change") puts a load on the system.

4. Add the tag to the taglist with OK.
5. Repeat the process for all other tags you want to transfer.
   - Any new or modified tag, as well as the associated entry in the editor tree, is displayed as changed.
   - The transfer of the taglist in runtime is activated with the setting "RCMS Runtime Transfer".
   - If you remove the check mark, then no tag values are transferred in runtime.

Note

The CMS editor also gives you the option of importing taglists.

4.2 Configuring the CMS Trace Viewer

"SIPLUS CMS" is used for condition monitoring or for the fast trace functionality. Independently of WinCC, trend values, among other things, are acquired and stored. The configuration and trace evaluation program required for this purpose is called X-Tools. However, this very powerful tool cannot be integrated into the WinCC environment. SIMOCRANE CMS provides an option with this objective in mind, namely the CMS Trace Viewer.

The Trace Viewer has a WinCC control for displaying stored trace data. The SIPLUS CMS Trace Viewer is included in the SIMOCRANE CMS scope of delivery.

In order for the Trace Viewer to be able to interpret the offline data and to make the data available for display in the control, you need to note the relevant instructions for creating a storage profile in X-Tools and to configure the Trace Viewer.

4.2.1 Scope of functions of the Trace Viewer

The SIPLUS Trace Viewer displays trace signals that have been acquired and saved by SIPLUS CMS X-Tools (offline data). The SIPLUS Trace Viewer is a client-server application. The server reads the data and makes it available to the client for display. The SIPLUS Trace Viewer client is is a web-enabled WinCC control for simultaneous representation of analog and binary trends.

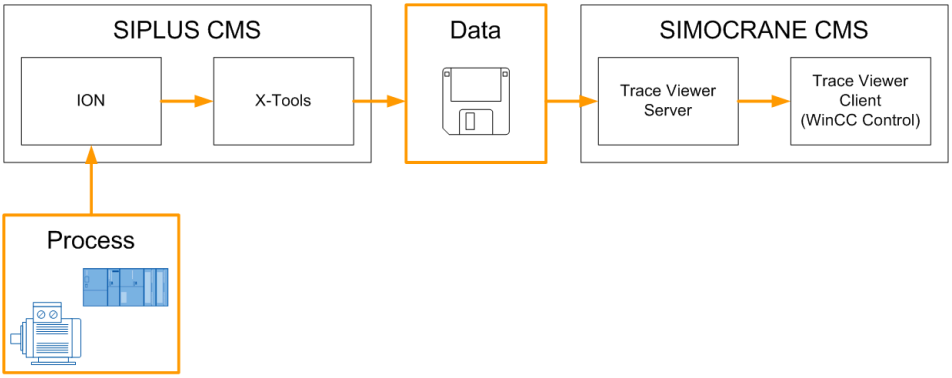


Figure 4-43 CMS Trace Viewer

The WinCC control covers the following functions:

Trend display

The display in WinCC control is divided into two sections:

- Section 1 (analog trends):

  Up to 8 analog trends can be displayed in this section. The analog trends can be either
  - allocated to a separate Y axis, or
  - a common Y axis, or
  - a common Y axis as a percentage.

- Section 2 (binary signals):

  Up to eight binary signals can be displayed in this section.

Selecting the trend data set

The selection of the trend data set (set configuration) is carried out using a separate dialog:

- The trend data set displayed can be configured.
- A displayed data set can be saved and changed.
- A data set can always only contain data of a storage profile.
- A data set is always assigned to a storage profile.

Time range

The control displays a defined time range and a given time stamp. The time range displayed can be adjusted up to a maximum of 30 seconds.

Zoom function

You can zoom the control display by moving the time axis or the Y-axis with the left or right mouse button, or by highlighting a square on the area.

Ruler

The ruler is positioned on the given time stamp and can be moved to the left or right along the time axis. The actual trend values and the time stamp can be read via the properties of the control.

Export

The data set shown can be exported to CSV format. A separate file is created for each trend.

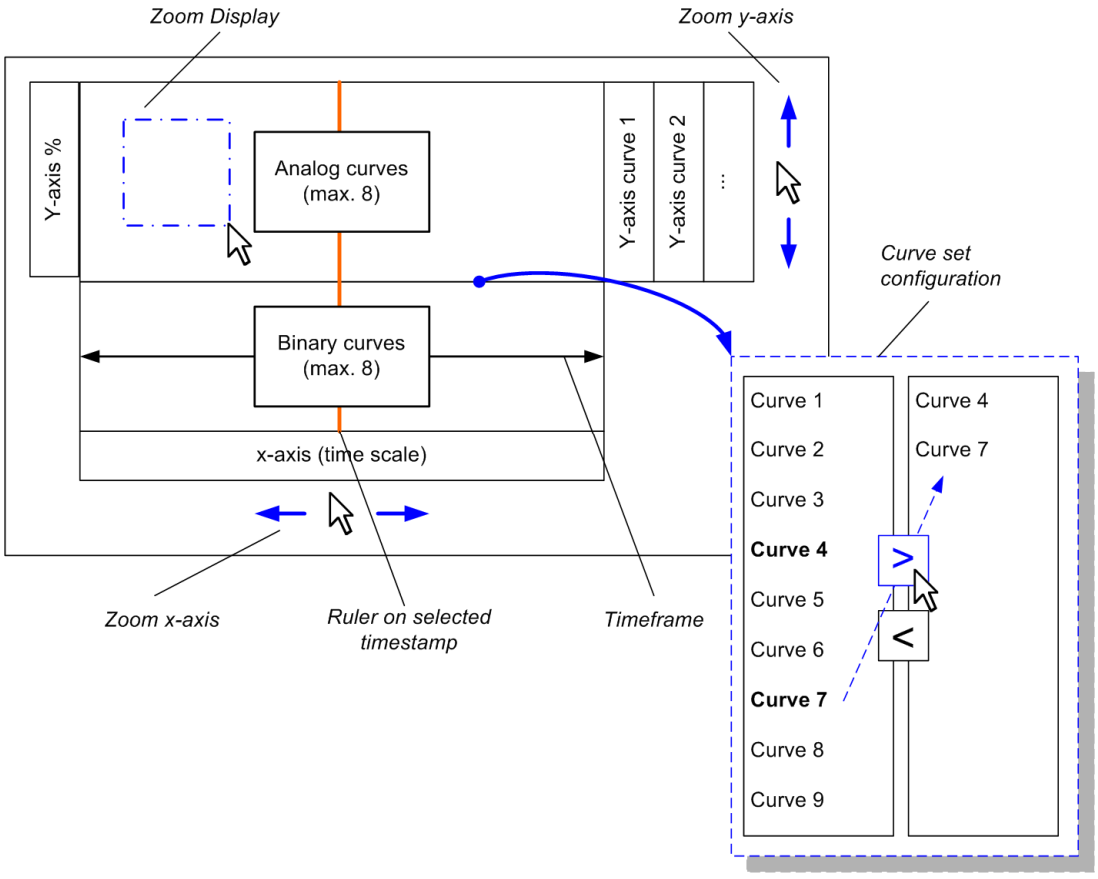


Figure 4-44 Range of functions of the Trace Viewer

Restrictions

- The minimum time interval between two data points in a trend curve is 10 ms. If the source data from X-Tools has been saved with a higher resolution, then the values are interpolated for display in the control. With the interpolation, the highest absolute value of the interval is set as visualization value.
- The Trace Viewer can only display offline data from SIPLUS CMS.
- The Trace Viewer can display up to eight analog and eight binary values simultaneously.
- The maximum time range which can be displayed is 30 seconds.

4.2.2 Information for configuring in X-Tools

Initial situation

Note

In this section, only those elements of X-Tools that play a decisive role for displaying data in the SIPLUS Trace Viewer are discussed. Detailed information on configuring X-Tools can be taken from the appropriate product documentation.

In X-Tools there is online data and offline data.

- Online data is the recorded data of an ION. It is configured in a "Device Profile" in the Device Management System (DMS). The online data can be displayed in the Monitoring System (MTS).
- Offline data is online data which has been stored by X-Tools. Online data which is to be stored is defined in a Storage Profile in the Storage System (STS). The offline data can be displayed in the Monitoring System (MTS) and with the SIPLUS Trace Viewer.

You have several options when creating the storage profiles:

- You can create several Storage Profiles, which each contain a set of data belonging together.
- You can create a "Storage Profile" that contains all data to be recorded.

When configuring a Storage Profile, you must observe the following instructions if the data is to be viewed subsequently using the SIPLUS Trace Viewer.

Processing steps

- File name (name of the Storage Profile)

  Save your profile. This is the name the SIPLUS Trace Viewer uses to subsequently call up data to be displayed (e.g. "Hoist").

- Data Storage Location - Path:

  Define the path under which your profile is to be saved. The path must be accessible for the SIPLUS Trace Viewer (local path or network path).
  Ensure that sufficient memory space is available.

Figure 4-45 Storage Profile – configuring "Data Storage Location"

- Subdirectory Creation:

  Fixed condition: Set up the folder structure as follows:

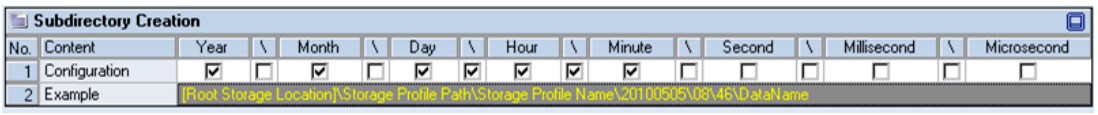


Figure 4-46 Storage Profile – configuring "Subdirectory Creation"

This will appear later on as follows in Windows Explorer:

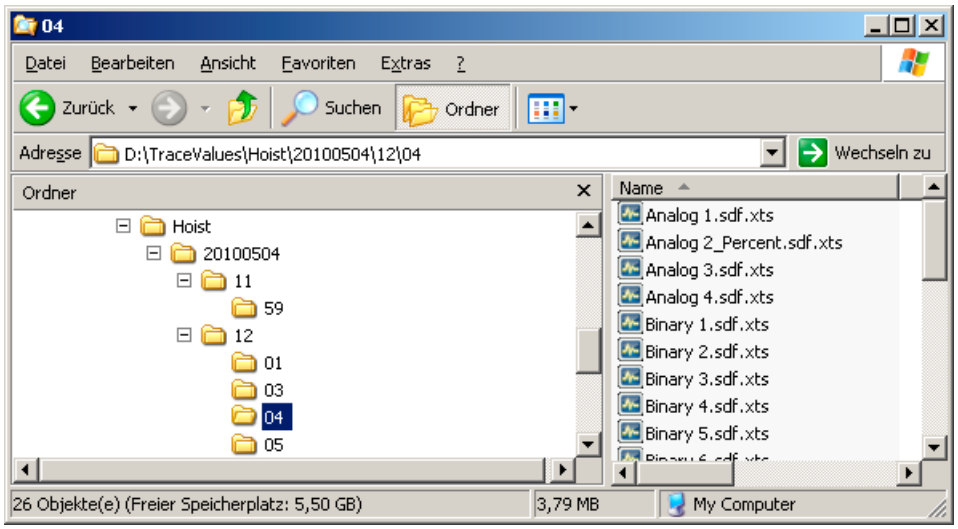


Figure 4-47 Storage Profile – folder structure in Windows Explorer

- File splitting:

  Fixed condition: Set the file splitting to one minute.

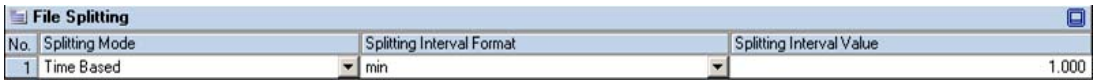


Figure 4-48 Storage Profile – configuring "File Splitting"

- Data:

  Using drag-and-drop, move the online data which is to be saved in this profile into the data table.

- Data name

  With the trend curve name you define whether a trend is assigned to the common Y-axis in %, or if it is assigned to its own Y-axis. To assign the trend curve to the % axis, give it the name suffix "_percent" in the "Device profile".

- Start Event/Stop Event

  Depending on your project requirements, you can create different trigger processes.

- When saving, please also note the settings for "Disk Clean-Up" and "Disk Limitations". You can configure a type of ring buffer here.

4.2.3 Installing and configuring the Trace Viewer

Initial situation

The SIPLUS Trace Viewer is installed using SIMOCRANE CMS installation and is located in the corresponding installation directory. The installation consists of a client application and server application.

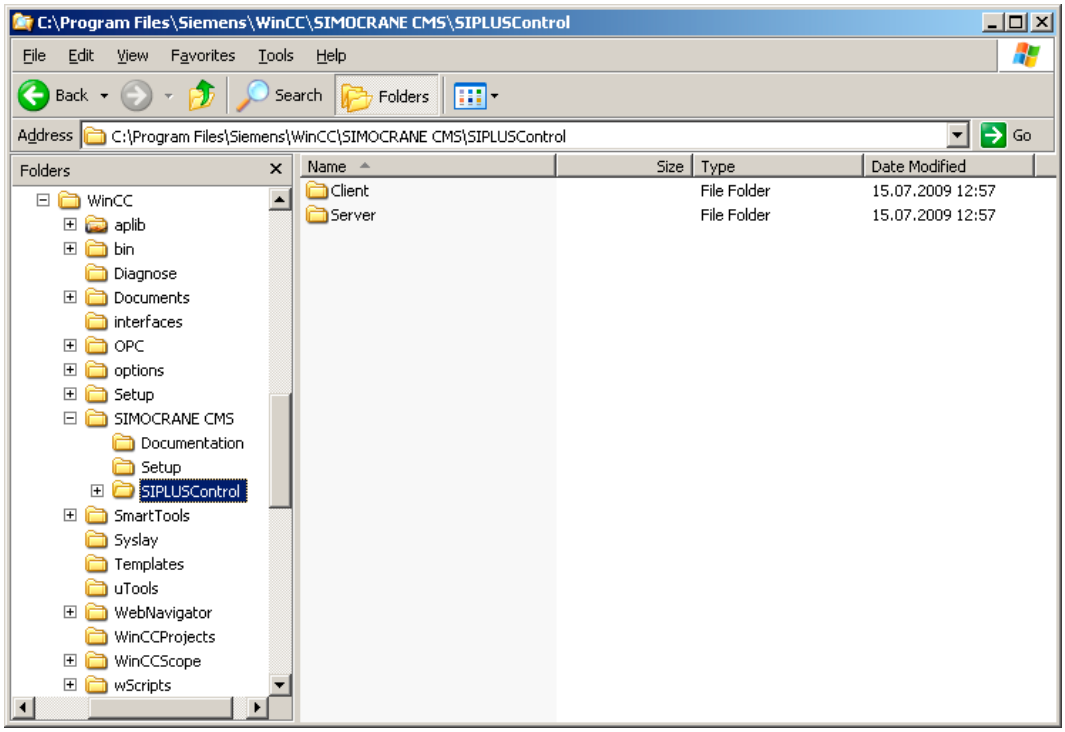


Figure 4-49 Installation directory of the CMS Trace Viewer

Processing steps – configuring the server application

The server application reads the data stored by X-Tools and makes it available to the client application. The server application is started via the file "scserver.exe" in the server directory of the SIPLUS Trace Viewer installation.

You can stop the server again via the Windows task manager.

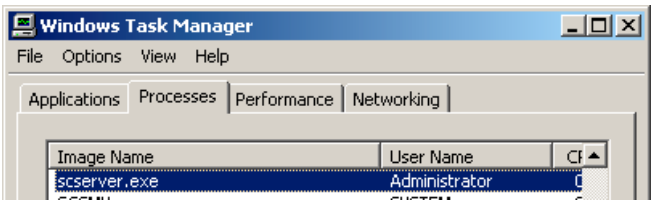


Figure 4-50 Trace Viewer server application "scserver.exe" in Windows task manager

The server application must run on the same PC as the X-Tools data is saved on. If this PC is not the CMS Station, you need to copy the server folder manually to the appropriate PC.

The server application is configured using an ini-file (scserver.ini) in the server folder. You need to restart the server after each change to the ini-file.

- Make the following settings in the ini-file:
  - [TCP] → address:
    Here, enter the IP address and port number of the computer on which the server application is to run. If client and server are running on the same PC, you can use the IP address 127.0.0.1.
  - [Curve Data] → ProfileRoot:
    Here, enter the path under which the memory profiles save your data (see setting "Data Storage Location → Path" in X-Tools).

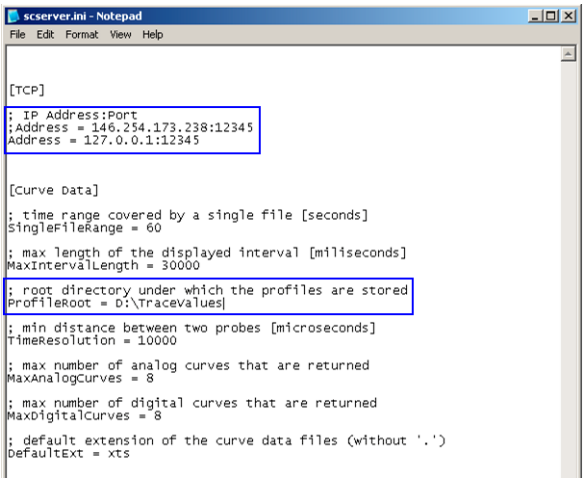

scserver.ini - Notepad
File Edit Format View Help
[TCP]
; IP Address:Port
;Address = 146.254.173.238:12345
Address = 127.0.0.1:12345
[Curve Data]
; time range covered by a single file [seconds]
SingleFileRange = 60
; max length of the displayed interval [miliseconds]
MaxIntervalLength = 30000
; root directory under which the profiles are stored
ProfileRoot = D:\TraceValues
; min distance between two probes [microseconds]
TimeResolution = 10000
; max number of analog curves that are returned
MaxAnalogCurves = 8
; max number of digital curves that are returned
MaxDigitalCurves = 8
; default extension of the curve data files (without '.')
DefaultExt = xts

Figure 4-51 Trace Viewer server communication parameters in "scserver.ini"

- Fault diagnostics

  The Trace Viewer server application has an output file. The output data is also configured using the ini-file of the server application (scserver.ini).

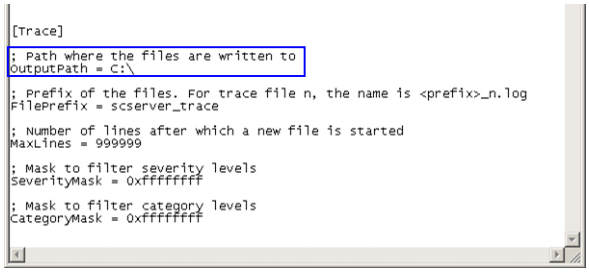

[Trace]
; Path where the files are written to
OutputPath = C:\
; Prefix of the files. For trace file n, the name is <prefix>_n.log
FilePrefix = scserver_trace
; Number of lines after which a new file is started
MaxLines = 999999
; Mask to filter severity levels
SeverityMask = 0xffffffff
; Mask to filter category levels
CategoryMask = 0xffffffff

Figure 4-52 Trace Viewer server output parameters in "scserver.ini"

Processing steps – configuring the client application

The SIPLUS Trace Viewer client is the WinCC control of the Trace Viewer. You will find an example representation earlier on in the CMS standard application, where the following configuration steps have been implemented.

- Insert the control in the graphics designer under the name "SIPLUSControl.ChartControl" in your WinCC screen.
- Open the control properties.

  The most important properties are described below:

Table 4- 8 Properties of the Trace Viewer control for WinCC

Property	Value	Description
ip_address		Here, enter the IP address of the PC on which the server application is running. Please ensure that the IP address entered is the same as the address set in the ini-file of the server application.
port_no		Enter the port number which is to be used by the server application here (compare ini-files of the server application).
timespan		Enter the timespan to be displayed in ms here. Please note that the maximum timespan permitted is 30 seconds.
profile_name		Name of the storage profile to which the displayed data set belongs.
set_name		Name of the displayed data set. If the data set is to be called up, for example, via buttons in the WinCC screen, then the set must be selected using a combination of profile name (profile_name) and data set name (set_name).

Property	Value	Description

timestamp		Transfer this property to the timestamp around which the timespan is formed, using the following VBS script:
		`Dim objControl, strTimeStamp`
		`' Read timestamp from TAG or io-field`
		`Set strTimeStamp = HMIRuntime.Tags("@CMSMessageTime")`
		`' apply timestamp to Trace Viewer Control and read data`
		`Set objControl = Screen Items("objTrace")`
		`objControl.Update = False`
		`objControl.timestamp = strTimeStamp.Read`
		`objControl.Update = True`
		The timestamp is always located exactly in the center of the control (initial position of the ruler). Lead time and delay time are half the timespan respectively.

Update	Yes	This property initiates the reading of the offline data. You will find an example of the dynamization of this property in the VBS script under Point 9.
name_curve_01 … name_curve_16		Name of the displayed curve 1 (... curve 16) from the storage profile being read. Changing of the name (e.g. when switching the profile) is also signalized via a corresponding control event. You can configure a key for this (see illustration "Events of the Trace Viewer control")
ruler_value_01 … ruler_value_08		Value of the curve 1 (... curve 8) for the timestamp at which the ruler position is located. The actual values are only specified for analog values. Changes to the value are also signalized via a corresponding control event. You can configure a key for this (see illustration below).
ruler_timestamp		Timestamp on the ruler position.
percent_scale_min		Lower limit of the percentage scale
percent_scale_max		Upper limit of the percentage scale
export_path		Export path for CSV files
StartExport	Yes	Exporting current data
FontScalingFactor		Changing the font size of the axis labels
Combine_YScales	Yes	All analog trends which are not assigned to the Y-axis will be assigned to a common Y-axis.
	No	Each analog trend which is not assigned to the Y-axis will receive its own Y-axis.
SetConfig	Yes	Display of the dialog for the data set configuration.
GetPrevious	Yes	Search for the last valid data set
GetNext	Yes	Search for the following valid data set

- Open the Events of the Trace Viewer control.

  Here you can configure a key for the plot in the WinCC graphics designer.

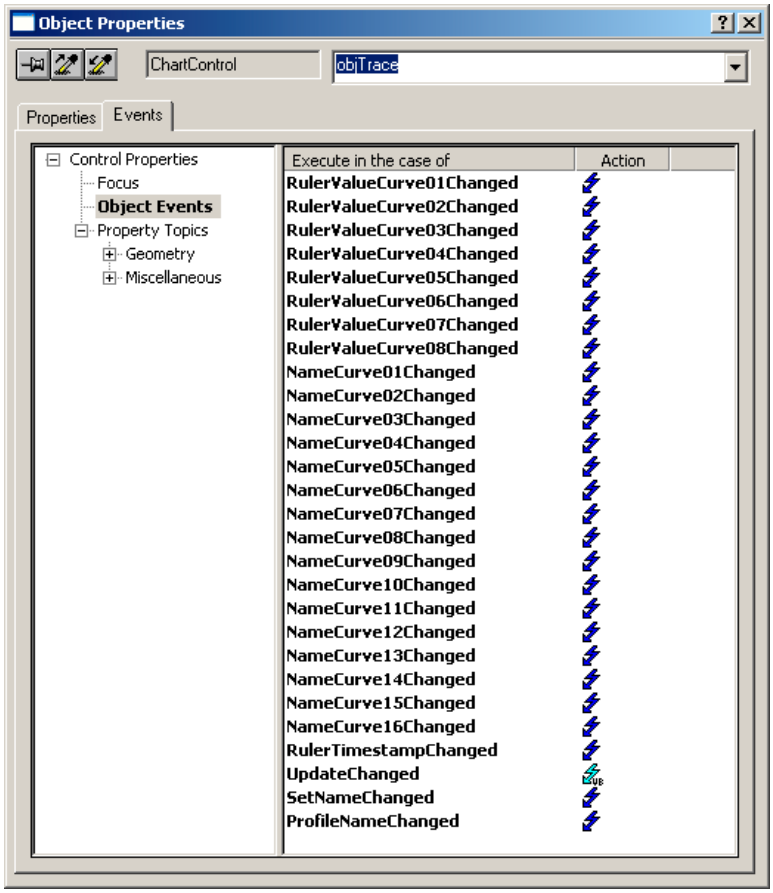


Figure 4-53 Events of the Trace Viewer control

4.3 Setting up remote access

Initial situation / objective

For remote access, the screens of the CMS station can be viewed from other stations in the network. Typical stations include touch operator panels in the driver's cabin or in the checker cabin, RCMS operator stations, a service PC in a maintenance building.

The mechanism for accessing screens of the CMS station is the WinCC Web Navigator. The Web Navigator server runs on the CMS station. The Web Navigator client runs on the other station (Web client).

An Office PC with Internet access is required to operate the web client. The Web Navigator client uses TCP/IP to connect to the Web Navigator server.

Processing steps – Web Navigator server (CMS station)

1. Establish a LAN connection between the local CMS station and web client PC.
2. Configure the Web Navigator server on the local CMS station.

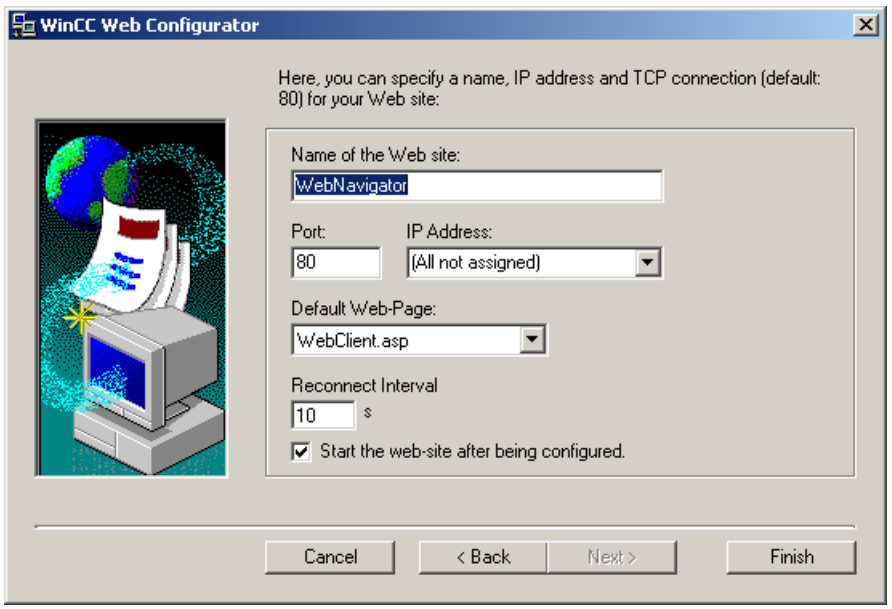


Figure 4-54 Configuration of the Web Navigator server

3. Launch the "Web-View Publisher" in WinCC Explorer and publish by following the instructions which appear in the dialog.

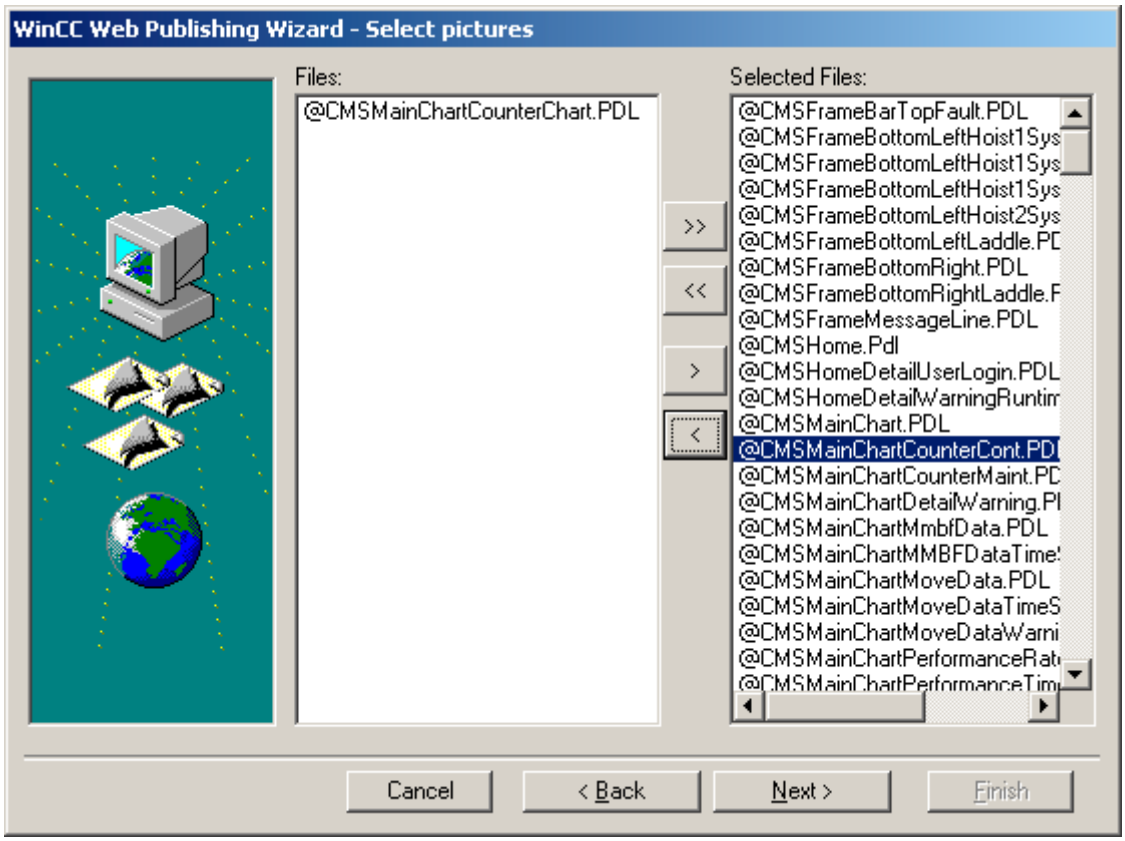


Figure 4-55 WinCC Web Navigator: Web View Publisher

4. As soon as you have added users who are to have access to the Web Navigator in the CMS standard application, you must enable access in the WinCC user administrator and define a start screen.

Note

If you want to use an alternative start screen for users in the Web Navigator, you must define this start screen in the WinCC user administrator under "Start Picture".

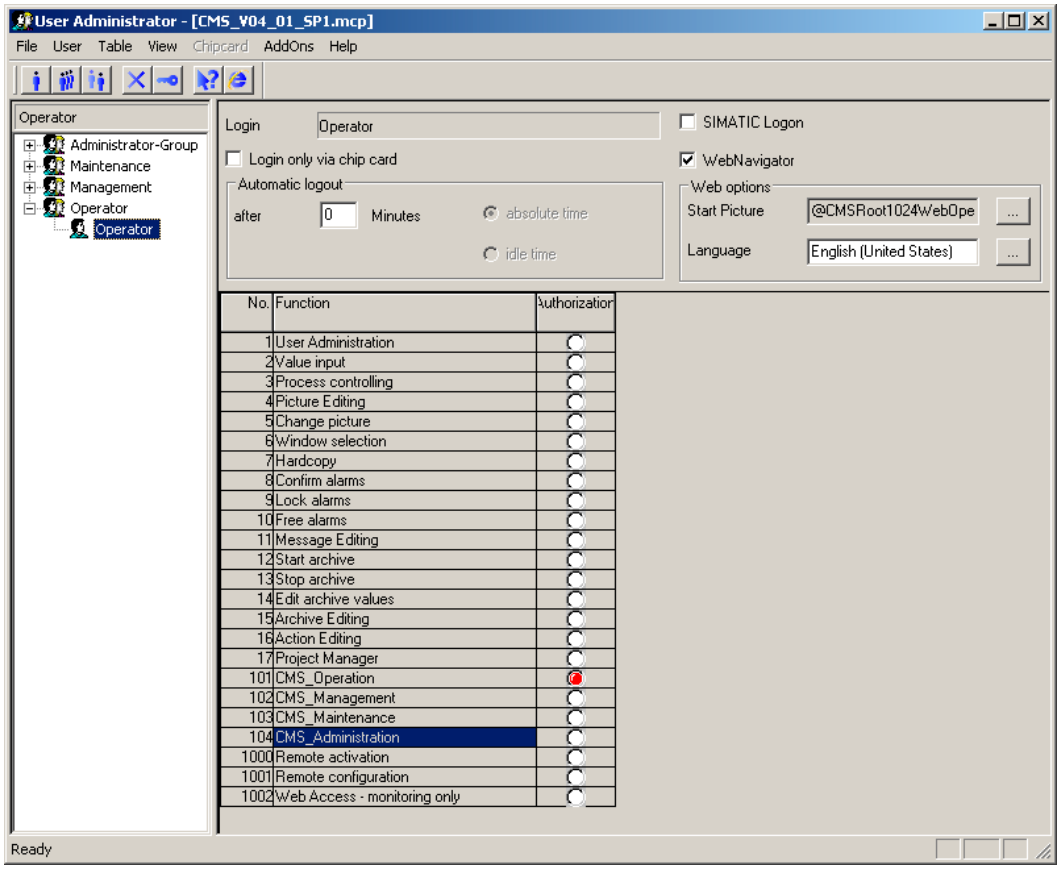


Figure 4-56 WinCC user administrator

If you are using functions in WinCC screens which are not executable in the Web Navigator, you will need to prevent them from running in WinCC using preprocessor instructions for C scripts. The same applies to displaying objects which trigger these functions. The following preprocessor instructions can be used:

Table 4- 9 Preprocessor applications for C scripts in WinCC

Variant	Notation

1	`#ifdef RUN_ON_WEBNAVIGATOR`
	`<< instructions which run on the web navigator >>`
	`#else`
	`<< instructions which do not run on the web navigator >>`
	`#endif`

2	`#ifndef RUN_ON_WEBNAVIGATOR`
	`<< instructions which do not run on the web navigator >>`
	`#else`
	`<< instructions which run on the web navigator >>`
	`#endif`

Processing steps – Web Navigator client (e.g. RCMS operator station in addition to the RCMS server)

1. Install the Web Navigator client and the SIMOCRANE CMS client on the web client PC (e.g. RCMS operator station)
2. Open Internet Explorer and enter
   `<<IP address of local CMS station>>/WebClient.asp>>`
   in the address bar.

Figure 4-57 Opening Web Navigator client on Windows PC

3. Enter an existing user name and the corresponding password in the logon dialog (e.g.: User name: **<<**`Operator`**>>**; password: **<<**`Operator`**>>**).

Result

The Web Navigator server is configured for access by the Web Navigator clients on any PC. You can launch the Web Navigator client on your station to test this.

For details of how configure the web client PCs for accessing the Web Navigator, refer to section PC configuration of the web client station (Page 205).

4.4 RCMS server

The RCMS server archives operational data and messages from all connected cranes (CMS stations), provides different evaluation and display options, and offers remote access to the CMS stations.

The WinCC standard tools (Alarm Logging and Tag Logging) and the WinCC Downtime Monitor will support you when archiving, evaluating and displaying the data on the RCMS server. The CMS WinCC add-on handles data transfer between the CMS station and the RCMS server.

On the RCMS server, the cranes (CMS stations) are sorted according to their equipment types.

When setting up an RCMS server, you must adhere to the following configuration steps:

Setting up a WinCC project with the following contents:

1. Setting up the project basis, consisting of WinCC screens and navigation

2. Settings in WinCC
3. Archive configuration of WinCC Alarm Logging
4. Archive configuration of the WinCC Tag Logging archive
5. Definition of the RCMS topology in the CMS editor (terminal tree)
6. Creating all configuration data from the CMS station
7. Comparison of configuration data between CMS stations of the same equipment type
8. Configuring the runtime data transfer
9. Configuring the Downtime Monitor project

The RCMS standard application includes:

- Examples for the configuration steps 1 - 5, suitable for CMS standard application.
- Import file for the WinCC Downtime Monitor.

4.4.1 Principles of data transfer

For data transfer, the CMS distinguishes between two cases:

- Transferring configuration data:
  Configuration data in the WinCC and CMS editors as a basis for the runtime data transfer
  - Operational data archive
  - Message configuration
  - Information for messages
  - Taglists
- Transmission of runtime data
  - Operational data
  - Alarms
  - WinCC tag values

4.4.1.1 Transferring configuration data

Configuration data is configuration data in the WinCC and CMS editors. These configuration data are initially part of the WinCC project of the CMS stations. Configuring the RCMS server is made simpler by transferring this configuration data between the CMS stations and the RCMS server. Data can be transferred in two directions:

- Upload:

  Transfer of configuration data from the CMS stations to the RCMS server; can be initiated by the CMS and by the RCMS. The configuration data of the CMS station are automatically generated on the RCMS server.

- Downloading:

  Transfer of the configuration data from the RCMS server to the CMS stations; can only be initiated from the RCMS.

These upload and download operations are always realized between cranes of the same equipment type. Cranes of the same design, therefore having the same data management, are combined to form one equipment type. At the RCMS, the data management is assigned to the equipment type. The following diagram illustrates the situation based on the example of STS and RMG cranes. The STS cranes ("STSCrane1" and "STSCrane2") have a different data management than the RMG crane ("RMGCrane1"). For example, they have a larger number of messages as well as a different message number range than the RMG crane. This is the reason that the STS cranes are assigned to the equipment type "STSCrane" – and the RMG crane, equipment type "RMGCrane".

When uploading configuration data, the data of the last transferred crane for the associated equipment type are always accepted at the RCMS. If the data of two cranes of an equipment type ("STSCrane1" and "STSCrane2") differ, then for this equipment type ("STSCrane") at the RCMS, the data from "STSCrane1" are overwritten by the data from "STSCrane2" if data was last uploaded from "STSCrane2".

After the described procedure, the data management of "STSCrane2" and the data management of the equipment type "STSCrane" are consistent at the RCMS. In order to correct the difference from "STSCrane2", the configuration data can be downloaded to this crane. After the download, the data for equipment type "STSCrane" at the RCMS, the data from "STSCrane1" and the data from "STSCrane2" are all consistent.

The connected crane "RMGCrane1", equipment type "RMGCrane", is not changed in any of the operations within the data management of the "STSCrane" equipment type. Cranes belonging to equipment type "RMGCrane" have their own data management. Also here, the same upload/download mechanisms apply as were previously described for the "STSCrane" equipment type.

A user interaction in the CMS editor is always required to initiate upload and download operations. Configuration data is never automatically synchronized in the background.

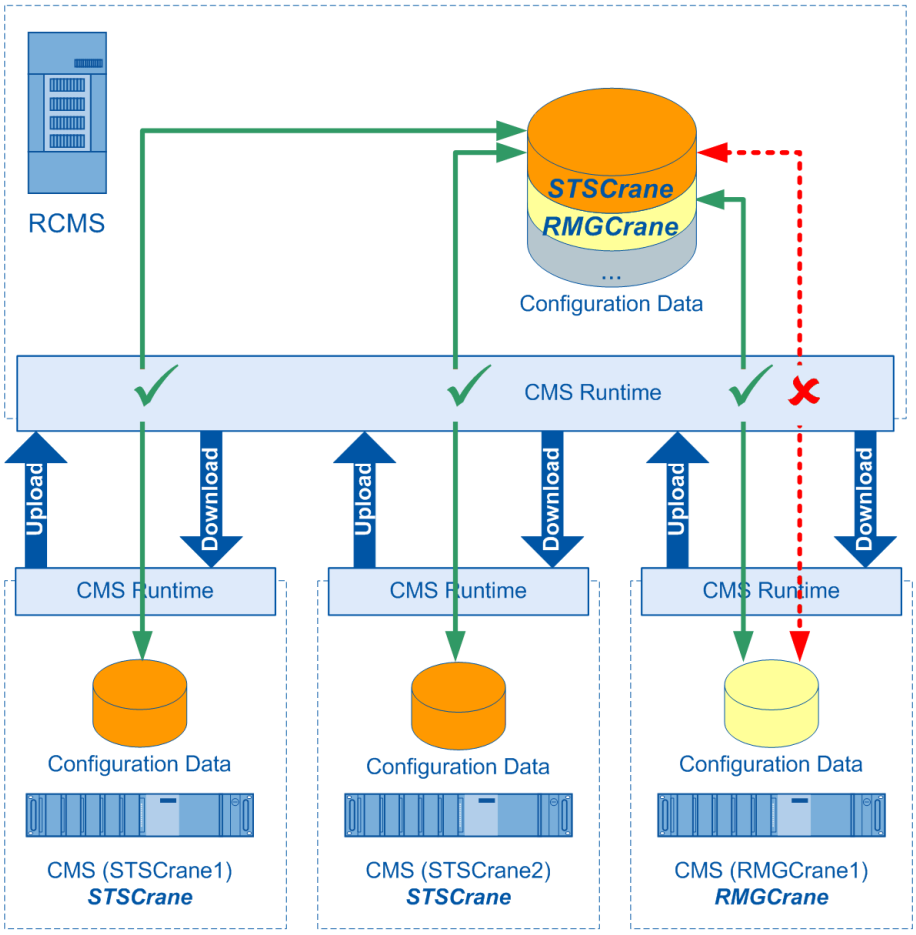


Figure 4-58 Principle of transferring configuration data

4.4.1.2 Transfer of runtime data

The transfer of runtime data includes:

- WinCC messages
- Operational data archive
- Tag values

All operational data archives, tags and messages belonging to a CMS station are identified using the crane names (e.g. "STSCrane1"; see the diagram below). The crane name is defined in the topology of the CMS editor.

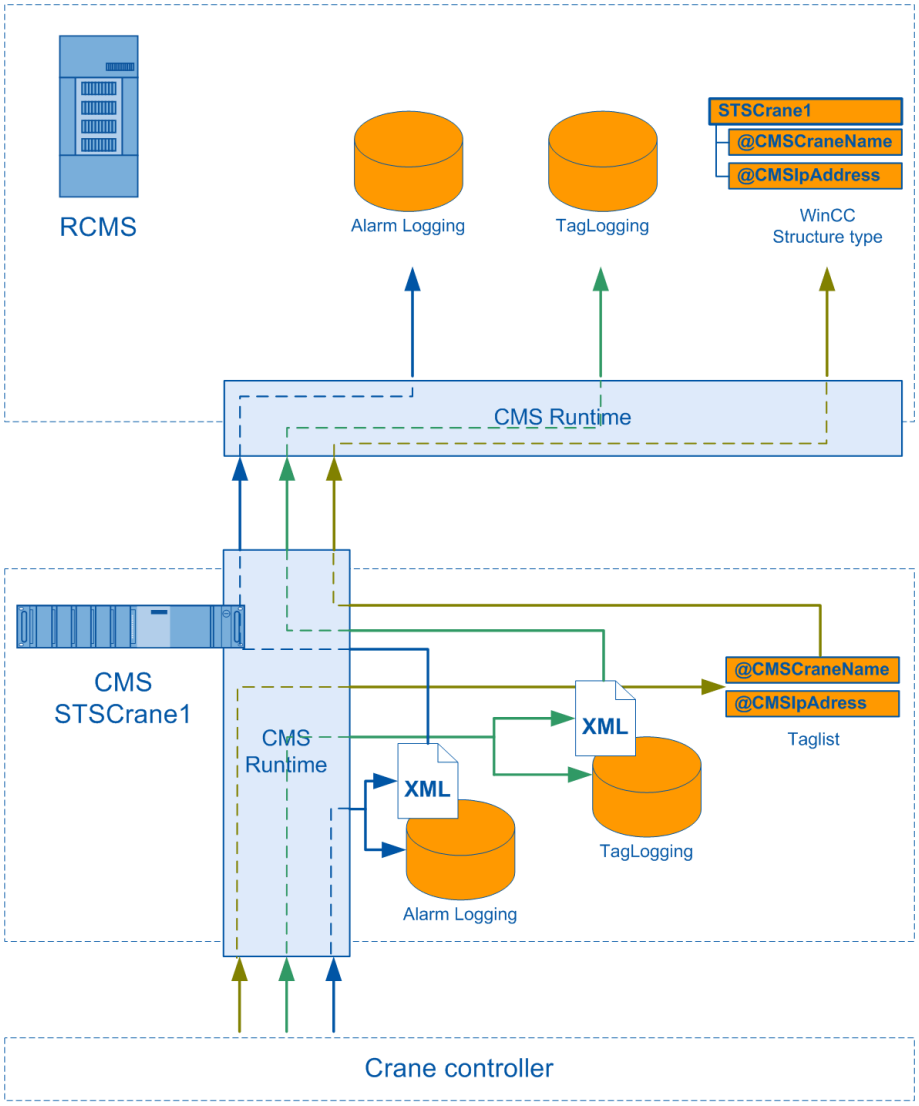


Figure 4-59 Principle of runtime data transfer

When transferring runtime data, no values already archived are transferred. On the CMS station, entry of messages and operational data into the WinCC archive takes place in parallel to the creation of XML interface files in the transfer directories (see Data interface for operational data and messages (Page 116)).

Using the XML files, you can check in the transfer directories

- whether data for transfer has been written
- whether the data has actually been transferred → deleted from the transfer directory

The XML files act as a data buffer if there is an interruption in the connection between the CMS station and the RCMS server. Tag values are not buffered.

Note

Please note that this buffer is limited. It is not recommended to buffer large numbers of files. In the CMS editor of the CMS station, set after how many hours the old XML files are to be deleted (see Checking the data volume (Page 213)).

4.4.2 Starting the CMS Runtime automatically

Ensure that the "CMSRuntime.exe" of the SIMOCRANE CMS WinCC add-on is entered in the Windows start-up list.

4.4.3 Settings in WinCC

Initial situation / objective

In order to start the RCMS standard application on your computer, you first have to make some basic settings in WinCC so that the default settings of the standard application can be adapted to your project environment.

Processing steps

1. Enter the name of your PC in WinCC Explorer under the computer settings in the "General" tab, as you did for the CMS station.

   Note

   Please note that the computer name cannot be precisely called "CMS".

2. Check whether the language settings for WinCC Runtime correspond to those for the CMS station.

Result

- Start the WinCC Runtime after the WinCC Explorer has been restarted.

4.4.4 Tag management

The RCMS server does not have a direct connection to the crane controller. This is the reason that the process values are transferred from the CMS station. Tags, whose values are to be transferred to the RCMS server must be defined in the taglist in the CMS editor on the CMS station. When the configuration data is transferred, the tags defined there are automatically created in the WinCC tag management of the RCMS server.

The tags are created as structure tags at the RCMS server. The structure type is equipment type specific. Therefore, the structure has the name of the equipment type with the prefix @CMS (e.g. "@CMSSTSCrane"). The crane name is the prefix of the structure instance of the crane (e.g. "STSCrane1"). The structure instance is created in the tag group "Crane name" (e.g."STSCrane1"). If this tag group is not yet available, it is created automatically.

Figure 4-60 Structure of the CMS stations on the RCMS server

Similarly to the CMS station, there are system tags on the RCMS. These tags and the crane status word defined in the CMS Editor → Topology are automatically created and transferred.

Tag name	Data type	Bit	Description
@CMSCraneName	Text tag 8-bit character set	-	Name of the crane
@CMSEquipment	Text tag 8-bit character set	-	Equipment type to which the crane belongs
@CMSIPAddress	Text tag 8-bit character set	-	IP address of the CMS station
@CMSConnectionState	Unsigned 16-bit value		Connection status to the RCMS server
		0	(CMS station / RCMS server) When starting the CMS Runtime, no major errors occurred. All local functions are active. There is no connection to the RCMS server.
		1	(CMS station / RCMS server) When starting the CMS Runtime, no major errors occurred. All local functions are active. The connection to the RCMS server / to all CMS stations is active.
		2	(RCMS server) When starting the CMS Runtime, no major errors occurred. All local functions are active. The connection to at least one CMS station is not active.
		7	(CMS station / RCMS server) CMS Runtime cannot run. When starting CMS Runtime, a fault has occurred that prevents CMS Runtime from being executed (e.g. WinCC Runtime has not been started, a crane has not been defined in the CMS editor, a wrong computer name has been entered into the CMS editor, ...). You can find more information on this fault in the CMS error file in the folder …\CMS of the WinCC project directory.

Processing steps

The tags are automatically generated on the RCMS server when the configuration data are subsequently uploaded.

Note

Note that only those tags are transferred that are entered on the CMS station in the CMS Editor under CMS-RCMS Data Transfer → Transfer Taglist.

4.4.5 Message system of the RCMS server

4.4.5.1 WinCC Alarm Logging

Initial situation

Just like the CMS stations, the RCMS server's alarm/event system is based on WinCC Alarm Logging.

Messages, group messages, message blocks, message classes and message types are generated automatically for the configuration data transfer. Please ensure that there are no overlaps in the configuration of your CMS stations. Such an overlap would be, for example, a WinCC message class which is assigned different definitions on the CMS stations of two equipment types. On the RCMS there is only one uniform definition for this message class.

When configuration data is transferred, at the RCMS, instance messages are generated based on the specific equipment type. Each equipment type features an instance message set.

For instance messages, the same message configuration is used for all cranes of an equipment type. However, during runtime a separate message is triggered for each crane. Assignment to the crane takes place dynamically via process value block 1 "Crane name". Additionally, process value block 2 contains the equipment type of the crane. User text box 10 is used in the RCMS standard application to display the crane name and equipment type from the process value blocks.

NOTICE
Process value block 1 is reserved for data transfer and may not be employed user-specifically.

The following diagram illustrates the principle of instance messages. The messages for "STSCrane1" and "STSCrane2" are the same. This is the reason that they are only created once on the RCMS server. If "Message#1" now occurs for "STSCrane1", then this information is transferred to the RCMS station. Process value 1 contains the information that the "STSCrane1" crane triggered this message. For the message display at the RCMS, "Message#1" from equipment type "STSCrane" is displayed. User text block 10 contains the information from process value blocks 1 and 2. "STSCrane2" uses the same message, however, in this case, the name "STSCrane#2" is transferred.

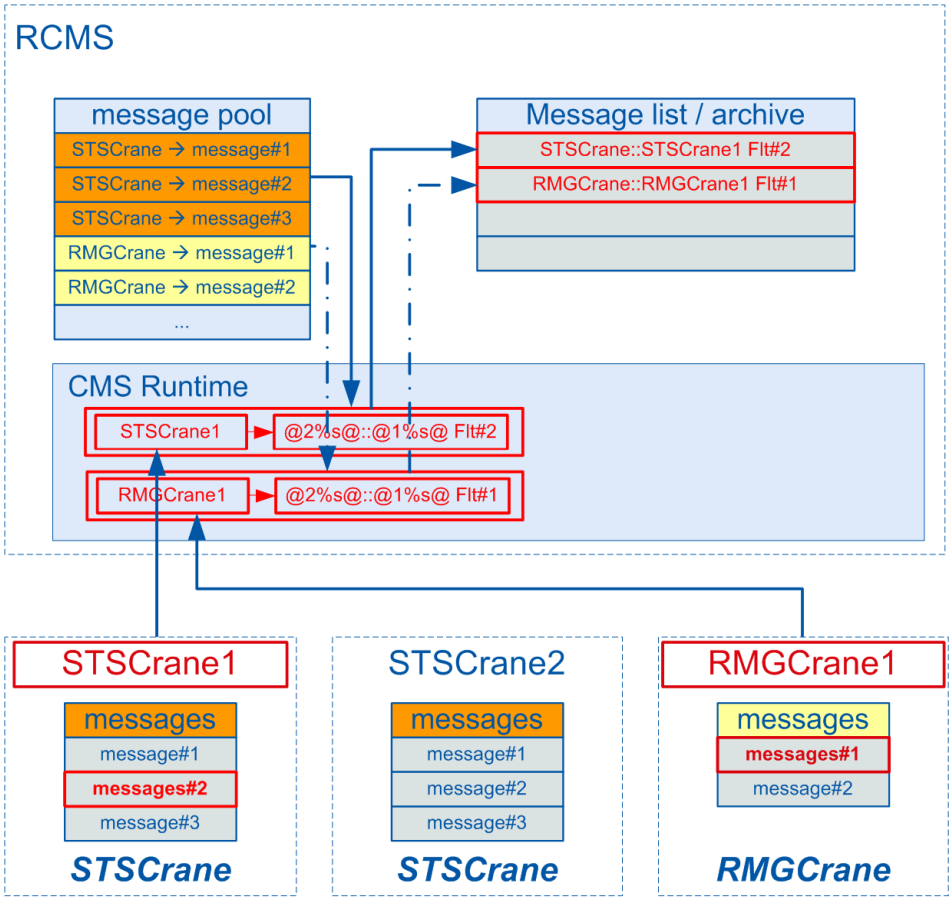


Figure 4-61 Principle of instance messages on the RCMS

Each instance message set of an equipment type is generated in the Alarm Logging editor of the RCMS server with a fixed offset. Cranes belonging to equipment type "STSCrane" have, for example, more than 2000 messages. Cranes belonging to equipment type "RMGCrane have more than 1000 messages. The message numbers differ.

In order that messages of both equipment types can be created at the RCMS server, you must allocate an offset to the messages of each equipment type at the RCMS server. The offset is defined for each equipment type in the CMS editor under "Topology" → "Equipment types" (see RCMS topology (Page 149)).

For example, here you can define an offset = 1000 for equipment type "STSCrane" and an offset = 3000 for equipment type "RMGCrane". For the messages from RMG cranes, an offset of 3000 is applied for each message number. Message number 1 at the CMS station of "RMGCrane1" corresponds to message number 3001 at the RCMS server.

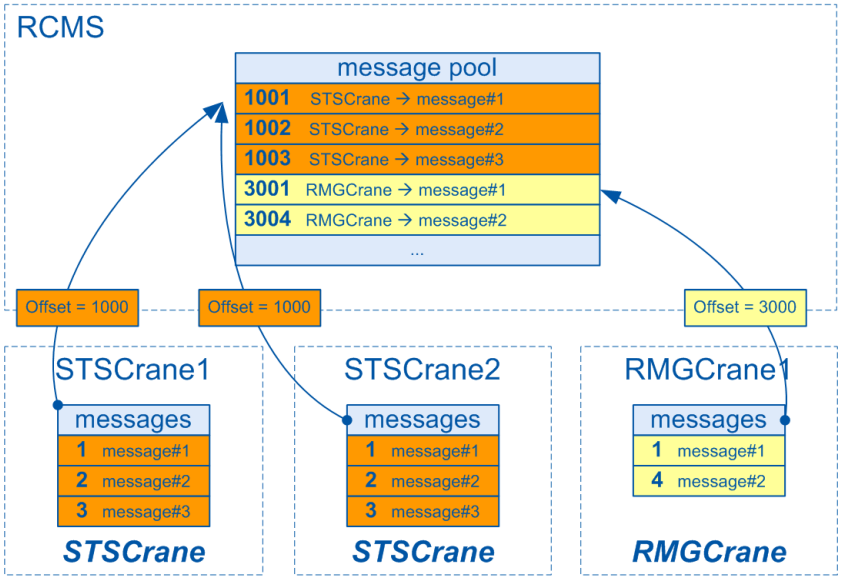


Figure 4-62 Offset for instance messages

Note

All the process tags used on the CMS stations are discarded.

Processing steps – configuring the alarm/event system

1. Open WinCC Alarm Logging.
2. Define the archive configuration to match your project requirements.

Note

Messages, group messages, message blocks, message classes and message types are generated automatically for the configuration data transfer.

Note

- Note that only those messages of the message classes are transferred that are marked on the CMS station in the CMS Editor under CMS-RCMS Data Transfer → Transfer messages.
- The messages from cranes of a certain equipment type should be the same.

4.4.5.2 Additional information

Each crane of an equipment type has the same additional information. These are saved for the equipment type at the RCMS.

The additional information at the RCMS server is automatically generated later when the configuration data are uploaded. A full data alignment is possible for maintenance instructions and references. Each message may only be assigned precisely 1 maintenance instruction, but as many references as required.

The following diagram illustrates the situation at two cranes of equipment type "STSCrane".

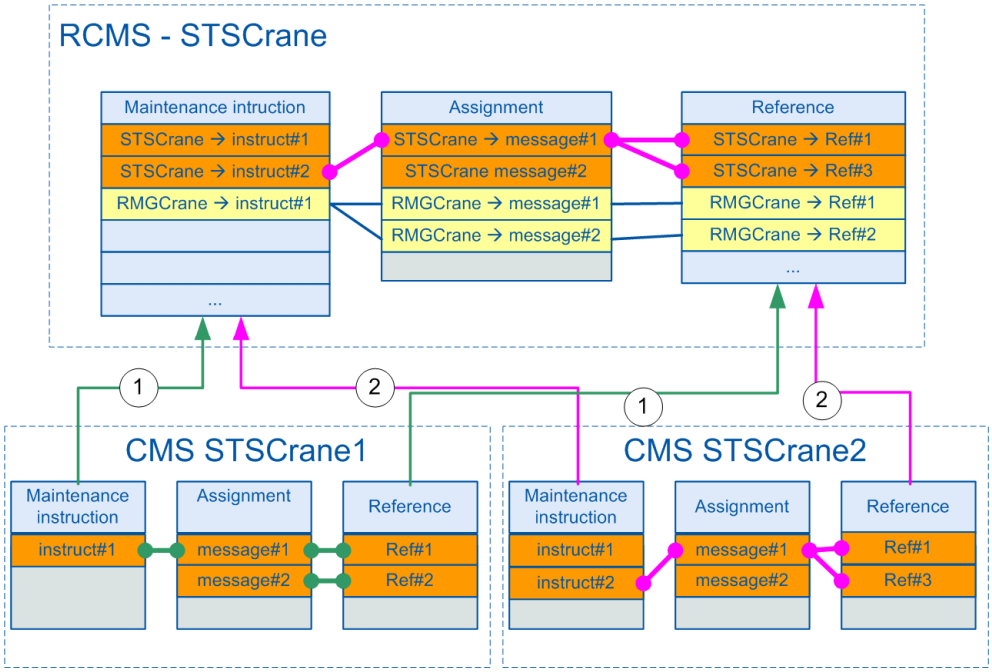


Figure 4-63 Additional message information at the RCMS

At "STSCrane1", message 1 (FLT#1) is assigned to note#1. However, at STSCrane2, message 1 is assigned to note#2. In the example, initially the data from "STSCrane1" were uploaded to the RCMS server. The data from "STSCrane2" were then transferred to the RCMS server. As data of the crane that was last transferred are always accepted at the RCMS, the data from "STSCrane1" are completely overwritten.

On the other hand, as each message can be assigned to several references, the reference list is expanded. For "STSCrane1", message 1 is assigned to reference#1. For "STSCrane2", message#1 is assigned to reference#3. After an upload to both cranes, message 1 is assigned to both reference#1 as well as to reference#3. Using a download, this assignment can now be aligned/synchronized with the CMS stations of both cranes.

Cranes belonging to equipment type "RMGCrane" have their own instance messages and therefore also their own maintenance instructions and references. The upload / download mechanism is the same as for the cranes belonging to equipment type "STSCrane".

4.4.6 Operational data of the RCMS server

Initial situation

CMS Runtime transfers three categories of operational data from the CMS stations to the RCMS server:

- Cargo handling data
- Time slices for counter values (operating hours, load and switching cycle counters)
- MMBF data

The data of all three categories is stored on the CMS station and on the RCMS server in WinCC Tag Logging archives. These Tag Logging archives are defined in the CMS editor of the CMS station.

During configuration data transfer (upload), the operational data archives defined in the CMS editor are automatically created in the WinCC Tag Logging of the RCMS server. At the RCMS server, they are allocated the crane name (e.g. "STSCrane1_") as prefix.

NOTICE
The length of the archive name is limited to 32 characters, the length of the process tag name is limited to 64 characters. Here, note that when transferring configuration data to an RCMS server, the archive names and the process tag names have the crane name as prefix, followed by "_". The total number of characters at the RCMS specified above must not be exceeded.

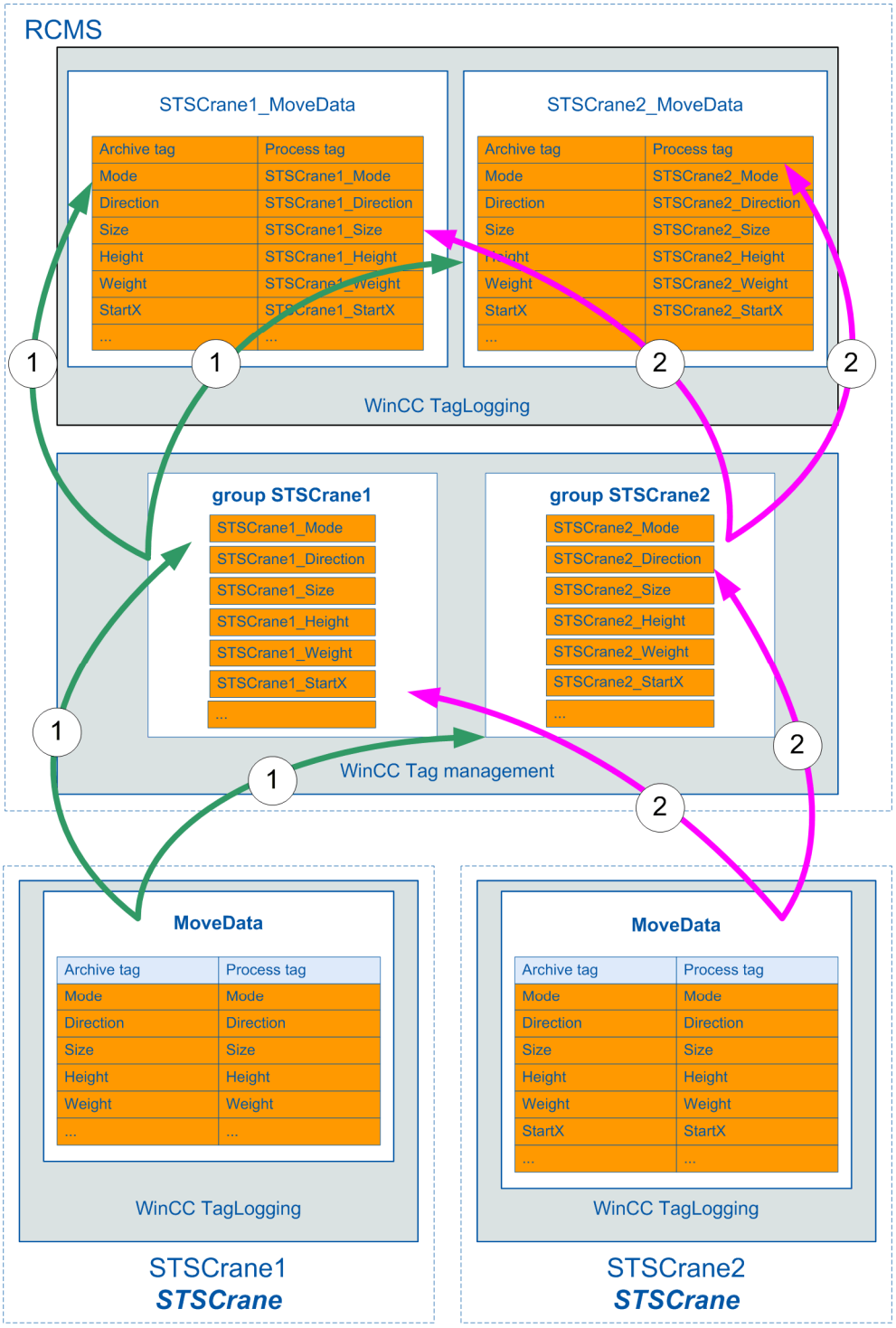


Figure 4-64 Operational data archive at the RCMS server

The process tags contained in the archives of the CMS station are created on the RCMS as internal tags in a tag group "Crane name" (e.g."STSCrane1"). They are no longer used.

Processing steps – archive configuration

1. Open WinCC Tag Logging → Archive configuration.
2. Define the archive configuration for "Tag Logging Fast" and "Tag Logging Slow" corresponding to your project requirements.

Note

You do not need to configure any Tag Logging archives or process tags on the RCMS. Both are created automatically later on when uploading the configuration data.

Note

Note that only the operational data archives and the archive tags contained in them are transferred, which are marked on the CMS station in the CMS editor under CMS-RCMS Data Transfer → Transfer operational data.

4.4.7 RCMS topology

Initial situation / objective

You will need to have the WinCC add-on SIMOCRANE CMS for the RCMS server installed on your PC and a valid computer name entered under "Computer" in the WinCC Explorer.

Define the CMS topology in the CMS editor under "Settings" → "Basic settings" → "Topology". There, set the topology "One RCMS server".

The setting "CMS with RCMS server" or "CMS without RCMS Server" is required on the CMS station.

After installing the CMS WinCC add-ons for the RCMS server, the topology "One RCMS server" is set.

You need to define the following components in the topology:

- the RCMS server
- the CMS stations of all connected cranes

Each crane must be assigned to a terminal and an equipment type (see CMS station). The assigned equipment type must fully match the setting on the CMS station.

The topology defined here determines the tree structure for the CMSNodeTree Control (see Terminal overview (Page 53)).

The communication parameters for each crane are defined here. The communication parameters must be available on the corresponding CMS station in the same way.

Processing steps – setting the topology

1. Open the CMS editor using the icon in WinCC Explorer.

2. Open the "System" → "Basic settings" → "Topology" dialog.

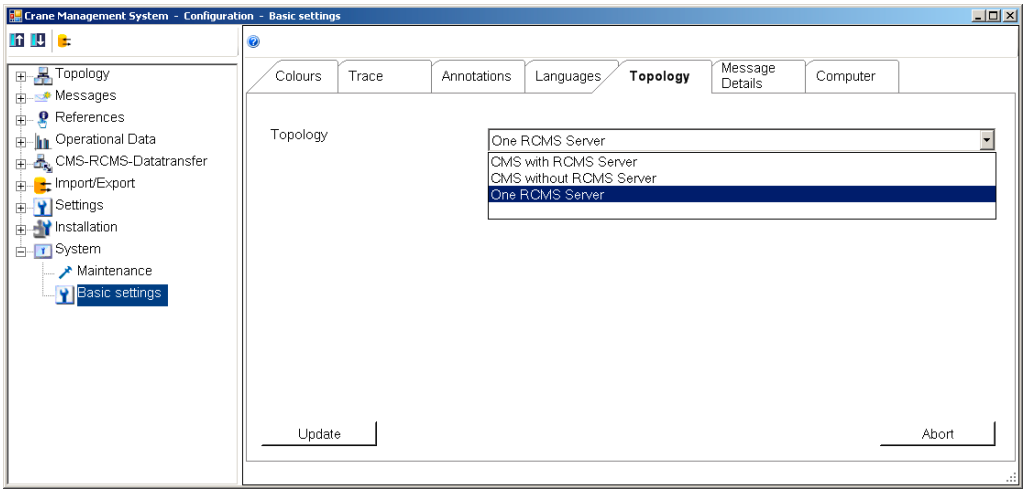


Figure 4-65 Changing the RCMS topology

3. In the list, select e.g. "One RCMS server".
4. Click "OK" to confirm your change.
5. Close and re-open the CMS editor to accept the setting.

Processing steps – create terminal

1. Open the "Topology" → "Terminals" dialog.
2. Define your terminal (e.g. "Terminal").

Processing steps – create equipment type

1. Open the "Topology" → "Equipment" dialog. Define all of the available equipment types here (e.g.: STSCrane, RMGCrane, etc.).
2. For the equipment type, select the symbols for displaying the status of the crane in the tree view (CMSNodeTree Control). The tree view recognizes five crane states.

Status	Description
Online	Connection to CMS Station, crane in operation
Standby	Connection to CMS Station, crane not in operation
Warning	Connection to CMS Station, warning pending
Fault	Connection to CMS Station, fault pending
Offline	No connection to the CMS station

1. Each state must be assigned one or more values (Value[1]; Value[2]; ..) or a value range (Value1 to Value[n]).

2. Under "Offset message number", define the offset for the instance messages of the equipment type.
3. Also create a type for your RCMS server (e.g. "RCMS"). No state definition or offset are required here for the message numbers.

Processing steps – create RCMS server

1. Open the "Topology" → "Cranes" dialog.
2. Create your RCMS server (e.g. "Server").
3. Assign your terminal (e.g. "Terminal") and an equipment type (e.g."RCMS") to the station.
4. Activate the "RCMS Server" option for the RCMS server.
5. Enter an IP address and port number for the RCMS server. The port number must be the same for the RCMS server as well as for all the connected CMS stations.

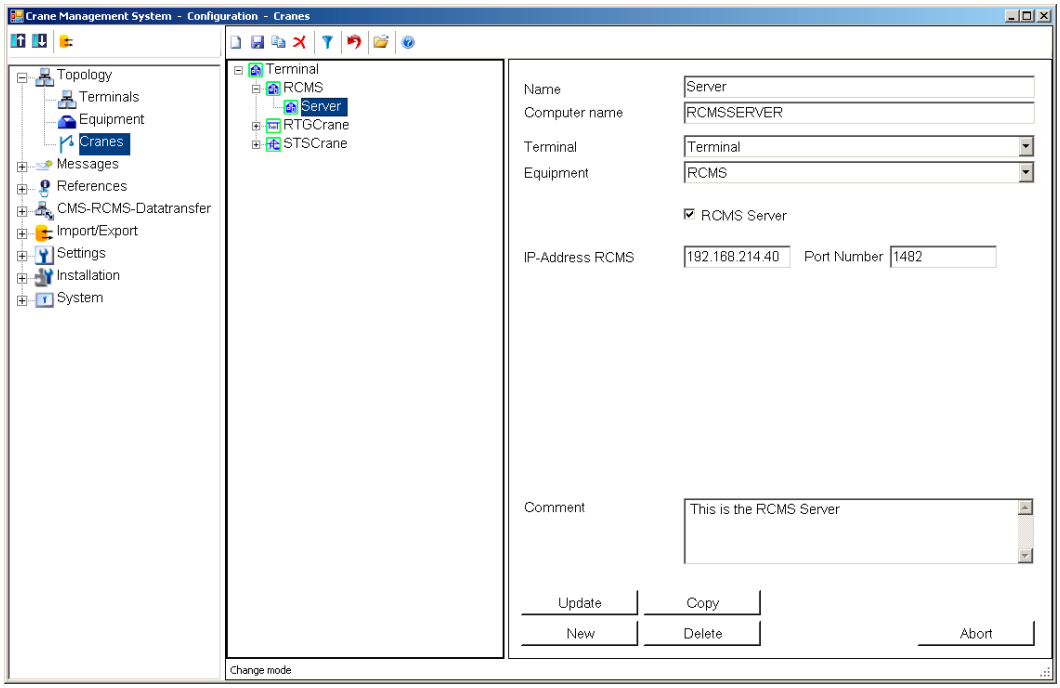


Figure 4-66 RCMS server

Processing steps – create cranes

1. Create all cranes (CMS stations) that are assigned to the RCMS server.

   The settings, which you must specify for the transfer of the configuration data of a crane from the CMS station, are marked with the "**mandatory**" supplement in the following. All other settings can be completed by the CMS station when the configuration data is transferred.
2. Open the "Topology" → "Cranes" dialog.
3. **Mandatory:** Insert a new crane using "New" (e.g. "STSCrane1")

4. **Mandatory:** Enter the computer name for the CMS station at the crane in the "Computer name" field.
5. **Mandatory:** Enter the IP address of the CMS station of the crane in the "IP address crane" field.
6. **Mandatory:** Enter the number of the port that is to be used for communication with the RCMS server in the "Port number" field. Ensure that the port number is the same on the CMS and RCMS sides.

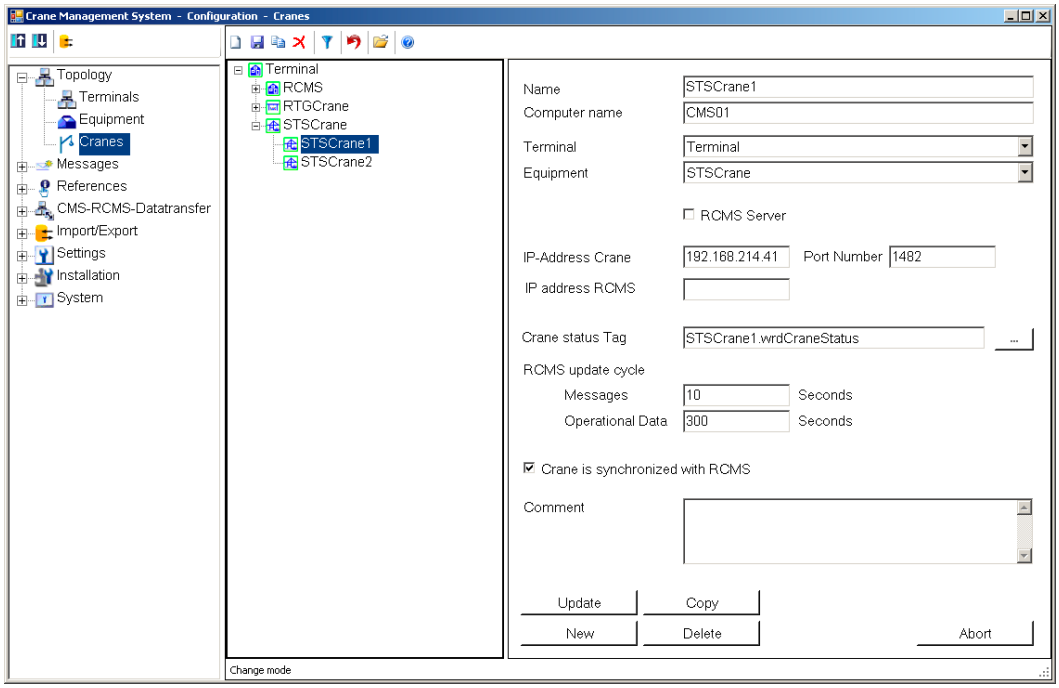


Figure 4-67 Configuring the crane at the RCMS server

7. The WinCC tag containing the crane status values is located in the field "Crane status tag". The tags are automatically entered when the configuration data is uploaded. For this, they must be defined in the CMS editor on the CMS station, under Topology → Crane (see CMS topology (Page 73)). The tag is included in the crane structure tag at the RCMS.
8. You can set the interval time in which the messages and operational data are transferred from the CMS station to the RCMS server under "RCMS update cycles".
9. Ensure that the check mark for "Crane is synchronized with RCMS" is set. Otherwise no configuration data or runtime data will be transferred.
10. Click "OK" to confirm your changes.
11. Proceed in the same way for all the other cranes.

4.4.8 Communication between the RCMS server and the CMS stations

After you have defined the RCMS topology, you can set up the communication to the CMS stations.

The following data is transferred between the CMS stations and the RCMS server:

- Configuration data
- Runtime data

The following requirements must be met for communication with the RCMS server:

- It must be possible for the CMS stations to be accessed by TCP/IP
- Setting up the CMS-RCMS communication on the CMS stations (see Chapter Communication with the RCMS server (Page 115)).
- CMS Runtime active on the CMS station
- RCMS topology is defined
- CMS Runtime on the RCMS server is active

You can check the status of the communication in the CMS editor in the dialog CMS-RCMS Data Transfer → Transfer, or in the NodeTree Control, e.g. on the start page of the RCMS standard application (see Chapter Tree view and statistics (Page 54)).

As soon as communication to the CMS stations has been established and configuration data are already available on the CMS stations, the status of the cranes in the transfer dialog of the CMS editor (CMS-RCMS Data Transfer → Start Transfer) is displayed as "online", however, "changed".

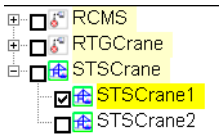


Figure 4-68 Status of the connected cranes in the CMS editor of the RCMS server

4.4.8.1 Generation of configuration data (upload)

Initial situation

When you set up a new RCMS project, it does not initially contain any configuration data for the crane. In order to simplify the configuration at the RCMS server, you can upload the configuration data of the individual cranes to the RCMS server. You can start the upload in the CMS editor on the CMS stations and at the RCMS server. When data are uploaded from several cranes of an equipment type their data is combined at the RCMS server. In order that the data are consistent, the data management of these CMS stations and the data management for the equipment type at the RCMS must be identical.

In order that the data are made consistent, some of the data can also be synchronized after the upload. The download handles this synchronization. The following diagram shows which data can be fully synchronized:

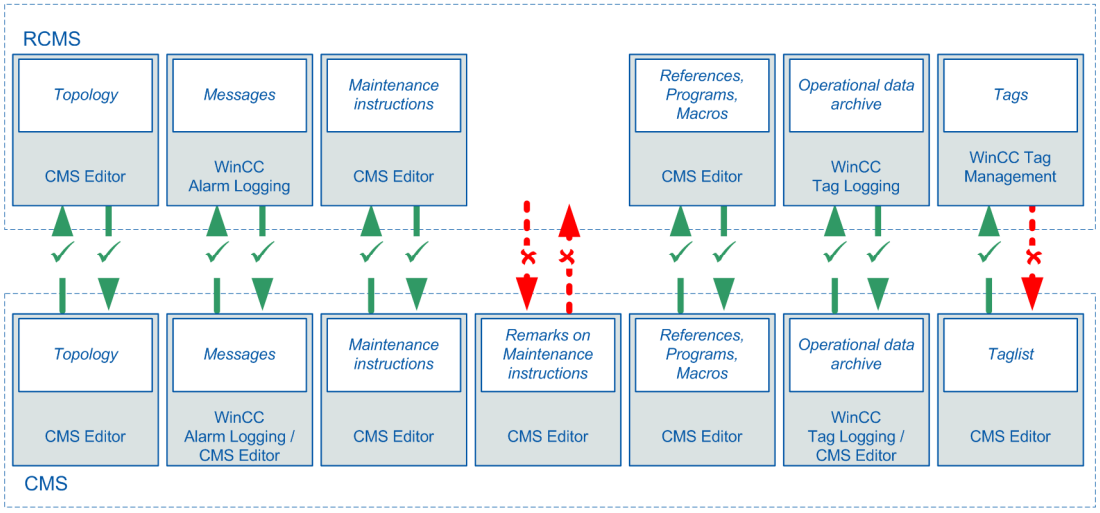


Figure 4-69 Transfer levels for the transmission of configuration data

Symbol	Name	Description
	Synchronization of data	Data can be can transferred in both directions ("upload" and "download"). A complete data synchronization between the connected CMS stations and the RCMS server takes place.
	Automatic data generation	The data can be uploaded from the CMS stations to the RCMS server. Synchronization of the data to other stations of an equipment type is disabled. The user is responsible for ensuring the data supplied to the CMS station is consistent.
	No transfer	Data, which must be manually configured at the CMS stations and on the RCMS server. The user is responsible for ensuring the data supplied to all stations is consistent.

The following requirements must be fulfilled for the upload:

- The CMS stations must have been configured (see Chapter CMS station (Page 61)).

NOTICE
If the data of cranes of one equipment type differ, then at the RCMS server, the data of the crane that was last uploaded is accepted for this equipment type. All other cranes are then marked as inconsistent.

- Communication with the CMS stations has been established (see this chapter)
- WinCC Alarm Logging of the RCMS server is configured. (see Chapter Message system of the RCMS server (Page 143)).
- The Alarm Logging archive settings are configured (see Chapter Operational data of the RCMS server (Page 147)).
- The RCMS topology is created (see Chapter RCMS topology (Page 149)).

- The WinCC editors (Alarm Logging editor, Tag Logging editor) are closed on the CMS stations and on the RCMS server.
- The CMS Runtime has been started on the CMS station and on the RCMS server.
- The WinCC Runtime of the RCMS server has been exited.

Processing steps – start upload at the CMS

1. Open the CMS Editor → CMS-RCMS Data Transfer → Upload at the CMS station of a crane (e.g. "STSCrane1"). Or press the Upload button in the toolbar. The button is only visible if changes to the configuration data have been made.

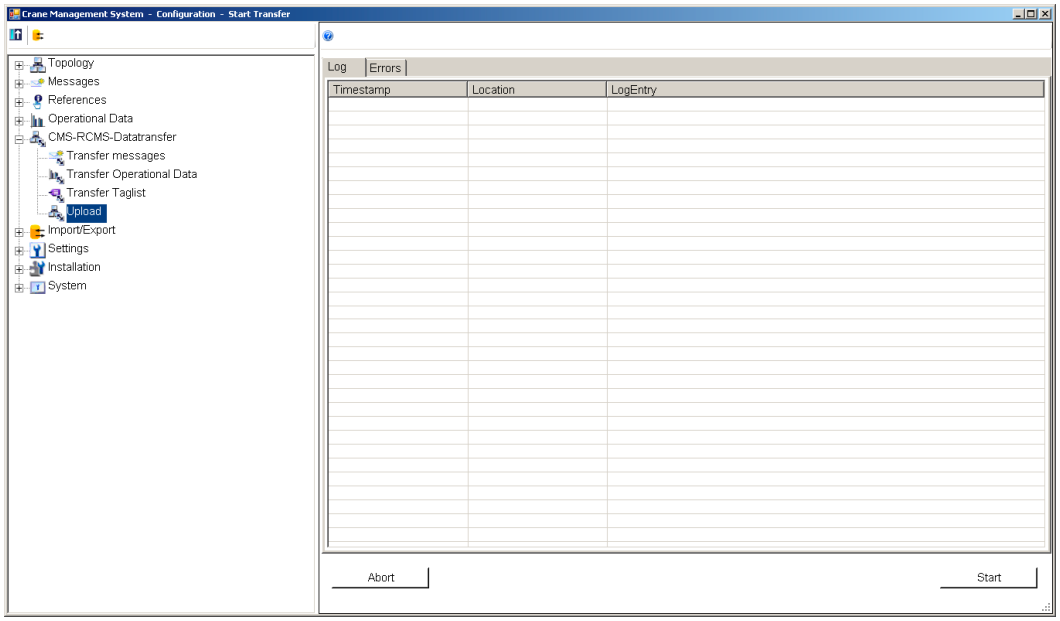


Figure 4-70 Uploading configuration data to the CMS station

2. When configuring the CMS station, if you defined messages, operational data, and WinCC tags of the CMS station, then you will see the "Changed" marking in the appropriate dialogs in the editor tree on the left-hand side. The status "Changed" refers to the data set available for this crane on the RCMS server. Before the first upload, there are no configuration data on the RCMS server.
3. As soon as all of the preconditions have been met, you can start the upload with the "Start" button on the right-hand side. The upload creates configuration data for the equipment type at the RCMS server (e.g. "STSCrane"), to which the respective crane is assigned (e.g. "STSCrane1").

NOTICE
Note that with the upload, data are completely overwritten on the RCMS server.

NOTICE
You are strongly advised against canceling an upload operation that has already started.

4. If the upload process was successful, you obtain a corresponding message ("Upload successfully completed"). If the upload was completed with errors, then you can read the error messages in the CMS Editor → "CMS-RCMS Data Transfer" → "Upload" under the "Errors" tab.
5. As soon as the data of the first crane have been loaded, you can open the CMS Editor → "CMS-RCMS Data Transfer" → "Upload" on the CMS station of another crane (e.g. "STSCrane2").
6. As soon as you have met all of the preconditions for upload, you can start the upload with the "Start" button on the left-hand side.

   If the CMS stations of all cranes of an equipment type are the same, then this upload does not overwrite any data on the RCMS server. The two stations and the data on the RCMS server for the equipment type "STSCrane" are consistent.
7. However, if the configuration data of the "STSCrane2" station differ from the configuration data of the first transferred station ("STSCrane1"), then the data on the RCMS server for the equipment type "STSCrane" are overwritten by the data of the "STSCrane2" station. The two stations and the data on the RCMS server for the equipment type "STSCrane" are not consistent.

   Using a download at the RCMS server, you can now download the configuration data for equipment type "STSCrane", which is available at the RCMS, to the station "STSCrane1". Please note that not all data can be synchronized in two directions (see Chapter Synchronizing configuration data (Page 158)).

Processing steps – start upload at the RCMS

1. Open the CMS Editor → "CMS-RCMS Data Transfer" → "Upload" at the RCMS server. Or press the Upload button in the toolbar. The button is only visible if the configuration data have been changed.

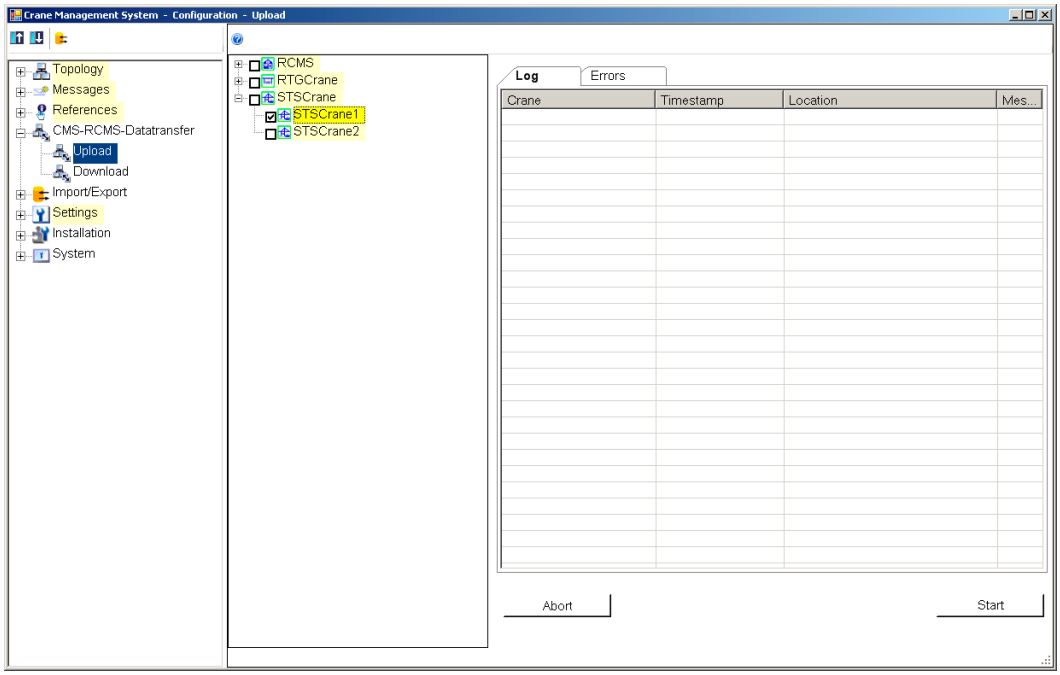


Figure 4-71 Uploading configuration data at the RCMS server

2. If all of the cranes are connected and, when configuring the CMS station, you have defined messages, operational data and WinCC tags of the CMS station, you can see the status "Changed" in the topology tree on the left-hand side of the dialog. If a crane is not connected, then it is shown as "offline". The status "changed" refers to the data set available for this crane on the RCMS server.

   Before the first upload, there are no configuration data on the RCMS server.

NOTICE
Note that with the upload, data are completely overwritten on the RCMS server. If you simultaneously start the upload for several cranes, then the data of the last crane of an equipment type in the topology tree (e.g. "STSCrane2" for equipment type "STSCrane") overwrite the data of the other cranes that were transferred to the RCMS shortly beforehand.

3. Select all cranes that are marked as "Changed" and whose configuration data you want to transfer by uploading (e.g. "STSCrane1", "STSCrane2"). If there is no connection to the relevant crane (status is "offline"), then the crane can no longer be selected.

If the upload operation was successful, the following situations result:

- The data of all CMS stations of an equipment type and the data for this equipment type on the RCMS server are consistent. This is the case, for example, if the projects of the CMS stations are identical.
- The data of all CMS stations of an equipment type and the data for this equipment type on the RCMS server are inconsistent. In this case, you can synchronize the data using a download at the CMS stations with deviating data management, which are marked as "changed". Remember that synchronization is not possible for all data types.

If the upload was completed with errors, then you can read the error messages in the CMS Editor → "CMS-RCMS Data Transfer" → "Upload" under the "Errors" tab.

NOTICE
You are strongly advised against canceling an upload operation that has already started.

4.4.8.2 Synchronizing configuration data

Initial situation

After you have transferred the configuration data of the CMS stations of an equipment type to the RCMS server, then it is possible that the data between several CMS stations is no longer consistent. For example, it is possible that e.g. the texts of WinCC message 1 on "STSCrane1" and "STSCrane2" differ. Since the data from "STSCrane2" were transferred last, they match the data in the data management of the associated equipment type ("STSCrane") on the RCMS. In order to ensure data consistency, you can synchronize message 1 from "STSCrane1" with the existing data on the RCMS server. The download handles this synchronization. You can only start the download at the RCMS server.

The "Transfer stages when transferring configuration data" diagram in Chapter Generation of configuration data (upload) (Page 153) shows which data can be fully synchronized.

The following requirements must be fulfilled for the upload:

- The CMS stations must have been configured (see Chapter CMS station (Page 61)).
- Communication with the CMS stations is established.
- The data from all cranes were initially uploaded to the RCMS server (see Chapter Generation of configuration data (upload) (Page 153))
- The WinCC editors (Alarm Logging editor, Tag Logging editor) are closed on the CMS stations and on the RCMS server.
- CMS Runtime has been started on the CMS station and on the RCMS.
- **WinCC Runtime of the CMS station has been exited.**

Processing steps

1. At the RCMS server, open the CMS Editor → "CMS-RCMS Data Transfer" → "Download", or press the Download button in the toolbar. (The download button is only visible if the configuration data have been changed.)

2. For example, if "STSCrane1" crane is connected, and its data do not match those for equipment type "STSCrane" on the RCMS server, then you see the status "changed" in the topology tree on the left side of the dialog.

NOTICE
Note that with the download, the data on the RCMS server is completely overwritten, also see Generation of configuration data (upload) (Page 153).

3. Select all of the cranes that are displayed as "changed" and to which you wish to download configuration data (e.g. "STSCrane1").
4. If the download process was successful, you receive a corresponding message. If the download was completed with errors, then you can read the error messages in the CMS editor → "CMS-RCMS Data Transfer" → "Download" under the "Errors" tab.

NOTICE
You are strongly advised against canceling an upload operation that has already started.

4.4.8.3 Runtime data transfer

Initial situation

For runtime data transfer, the following requirements must be met:

- Communication between the CMS stations and RCMS server is established.
- The generation of configuration data on the RCMS server and the configuration data synchronization have been completed and the data on the CMS stations and on the RCMS server are consistent (see Chapter Synchronizing configuration data (Page 158)).
- The creation of XML files is activated on the CMS stations (see section CMS topology (Page 73)).
- The transfer of the XML files is activated on the CMS stations (see section CMS topology (Page 73)).

Processing steps

As soon as these conditions are met, the data from the CMS station is transferred to the RCMS server.

For operational data and messages, you can use the XML files to check in the transfer directories

- whether data for transfer has been written.
- whether data is actually being transferred.

  If the data are transferred, they are deleted from the transfer directories. If an error occurs during the transfer, the file will be moved to the "Errors" folder.

4.4.9 Downtime Monitor project

In the RCMS application example, the Downtime Monitor (DTM) records the following basic data from the RCMS server tag management:

- Operating states of all connected cranes
- Counter values of the connected cranes

All counter values and operating states are read from WinCC tags. These WinCC tags must be transferred from the connected CMS stations to the RCMS server WinCC tag management.

The status word and counter of a crane are used to observe its performance (algorithms).

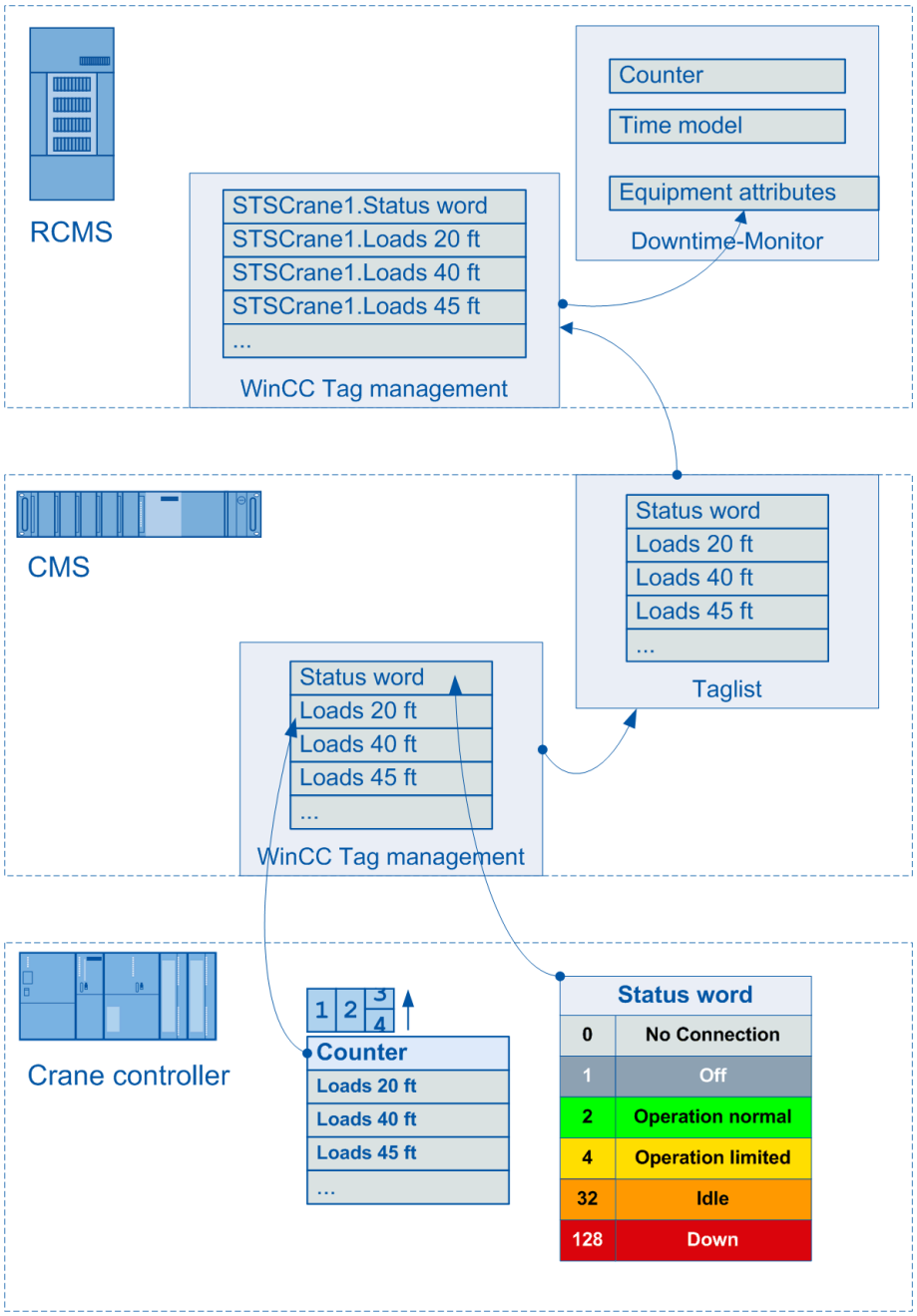


Figure 4-72 Basic data of the DTM

4.4.9.1 Integration of the DTM project

Initial situation

The DTM project data is not automatically copied along with the WinCC project. Whenever a WinCC project has to be copied, you first have to export the Downtime Monitor project from this WinCC project.

You will find the DTM example project in the subdirectory …\CMS\DowntimeMonitor.

Processing steps – importing a project

1. Open the WinCC Explorer
2. Make sure that the DTM is activated in this project (WinCC Explorer → PI_Option → AdministrativeTools → Right-click → Options).
3. Open the project management tool (WinCC Explorer → PI_Option → AdministrativeTools).

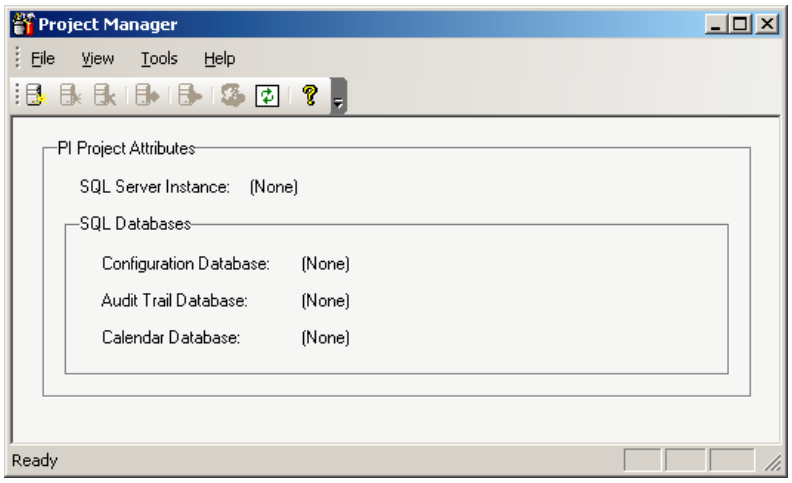


Figure 4-73 DTM project management tool

4. Import the project example (Tools → New project).
5. In the following you need to define the database configuration of the DTM. This depends on the size of your PC drive. You can also start off with a small database configuration and then adapt it later using Project → Change.

Note

Please make sure in advance that there is enough memory available. The DTM documentation includes a list of what you need to take into account when defining the databases, and what layout you should provide.

Processing steps – setting user rights

1. If the import operation was successful, open the WinCC User Administrator.

2. User rights 600-605 are used for operating the DTM control. Assign the appropriate rights to your users.

Processing steps – enable operation of runtime

The are VBS standard modules in the installation directory for runtime operation of the DTM control via VBS scripts. In order for the RCMS application to be able to use these modules, you need to copy both functions into the WinCC installation directory.

1. Open the folder …\WinCC\SIT\Documentation\DTM Example Pages.
2. Copy the files AUI_DTM.bmo and WRITEBACK_DTM.bmo into the directory …\WinCC\aplib\ScriptLibStd.

4.4.9.2 Time model and status word

In the DTM example project there is the following assignment between time model and machine status:

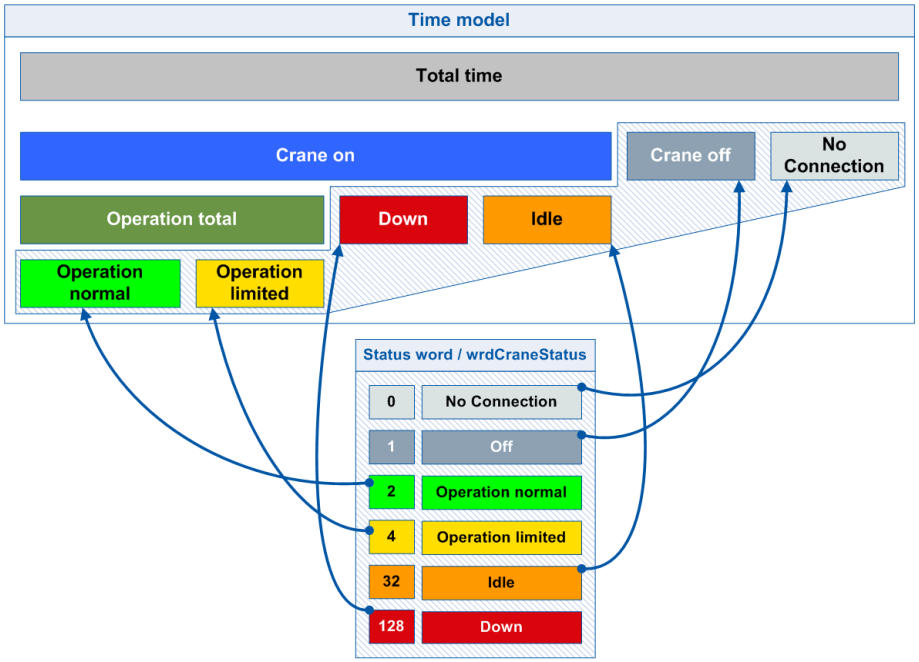


Figure 4-74 Time model and status word in the DTM example project

Each time category is assigned to precisely one machine state. The same assignment is used for each equipment.

Each equipment has its own status word. The data source is a WinCC tag (e.g. "STSCrane1.wrdCraneStatus") in the RCMS tag management.

Note

The time model is the basis for the DTM project. You cannot change the time model as long as there is linked data in the project.

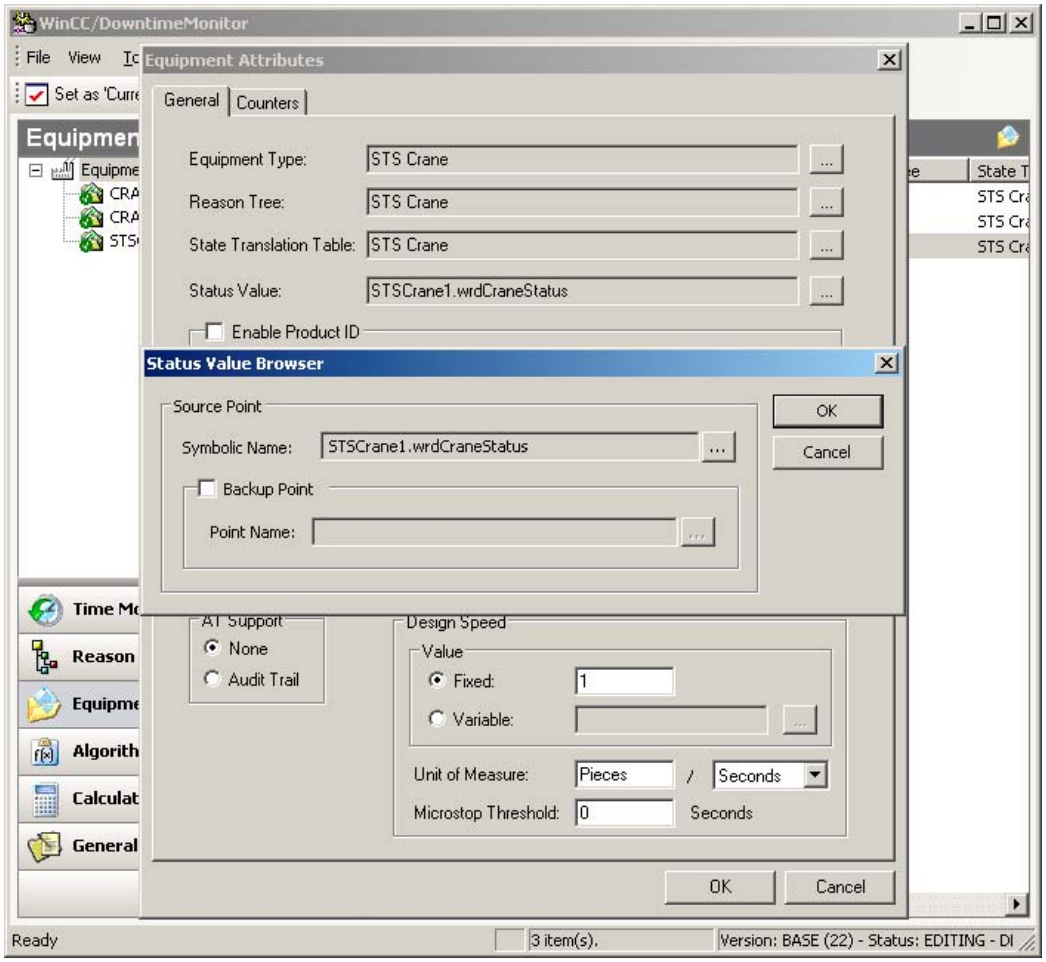


Figure 4-75 Status word definition for the equipment

4.4.9.3 Counters

The following counters are configured in the DTM example project:

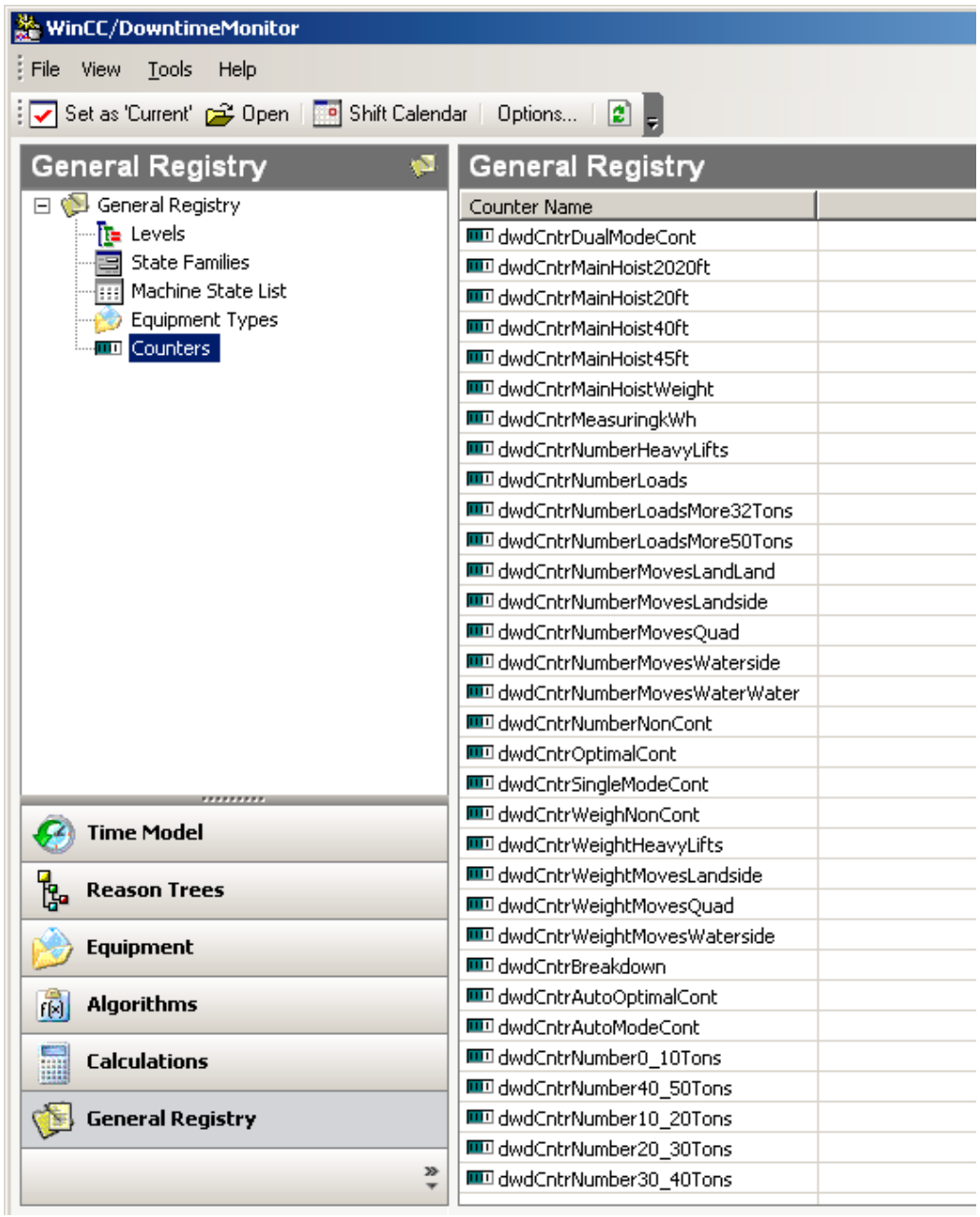


Figure 4-76 Counter values in the DTM example application

The data source for the individual counter values is assigned to each device in the form of WinCC tags in the RCMS tag management.

- All configured counters are used for the example equipment.
- The recording of the counters is set to 2 minutes. You can change the cycle.

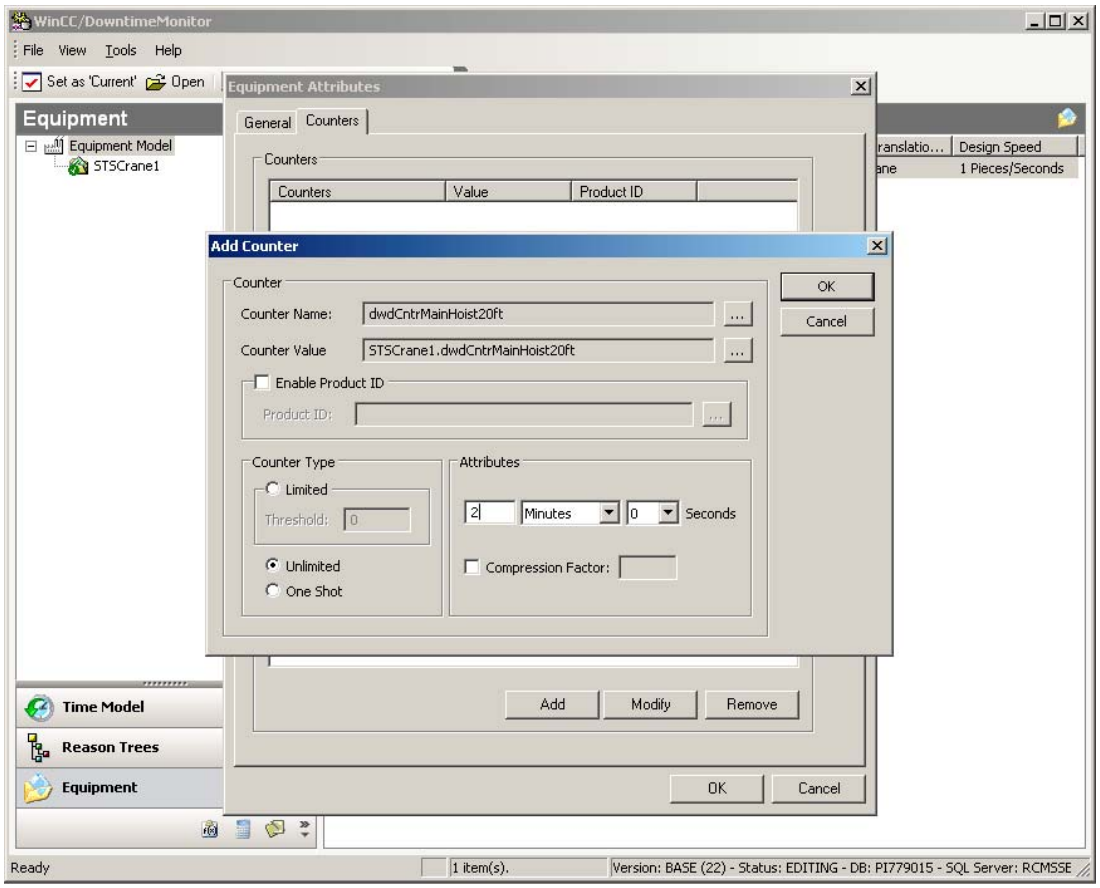


Figure 4-77 Counter definition on the device

4.4.9.4 Algorithms

Using algorithms, you can calculate a variety of performance indicators from your basic data (status word and counter). The following algorithms are available in the DTM example application:

Table 4- 10 Algorithms in the DTM example application

Name	Formula	Description
TEU	TEU = 20 ft •1 + 40 ft • 2 + 45 ft • 2.25	Number of standard containers that have been handled
CRANE_OFF	Duration, time category "Crane off"	Duration of the time category, Crane off
CRANE_ON	Duration, time category "Crane on"	Duration of the time category, Crane on
DOWN	Duration, time category "Down"	Duration of the time category, Down
IDLE	Duration, time category "Idle"	Duration of the time category, Idle

Name	Formula	Description
NO_CONNECTION	Duration, time category "No connection"	Duration of the time category, No Connection
OPERATION_LIMITED	Duration, time category "Operation limited"	Duration of the time category, Operation limited
OPERATION_NORMAL	Duration, time category "Operation normal"	Duration of the time category, Operation normal
OPERATION_TOTAL	Duration, time category "Operation total"	Duration of the time category Operation total = Operation limited + Operation normal
PERFORMANCE_RATE	$\frac{\text{Container}}{\text{Design Speed} \bullet \text{Operation\_Total}}$	Number of handled containers referred to the design performance and the available operating time (design performance = moves/hour)

4.4.9.5 Changing or adding a crane

Cranes are DTM equipments.

The example project contains an equipment as a template. You need to add the crane to your project as a DTM device. The simplest way is to use the Excel export/import.

1. Open the Downtime Monitor project.
2. To be able to start the export, set up a new DTM project version using "New version".

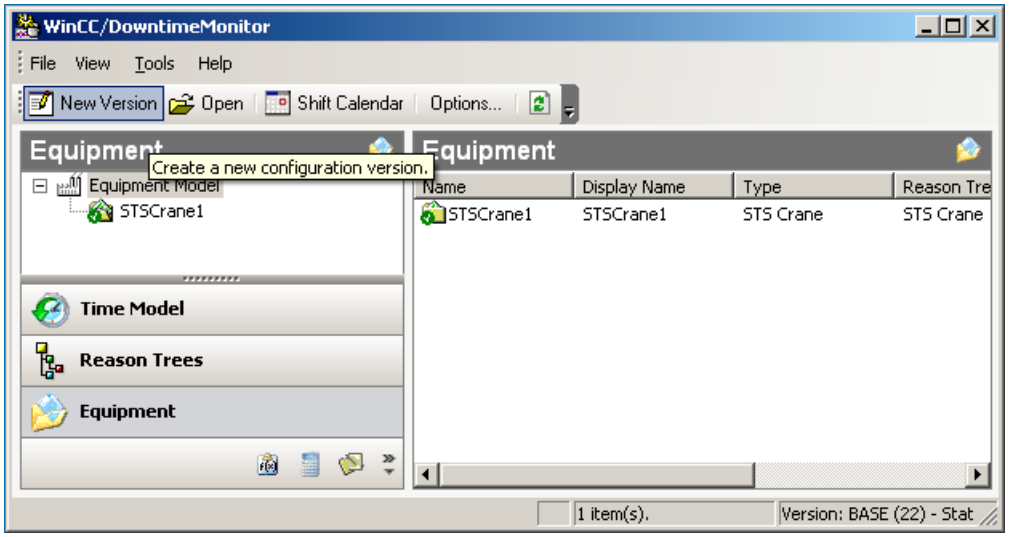


Figure 4-78 Setting up a new Downtime Monitor version

3. Export the project to Excel. The DTM documentation contains information on editing the Excel spreadsheets.

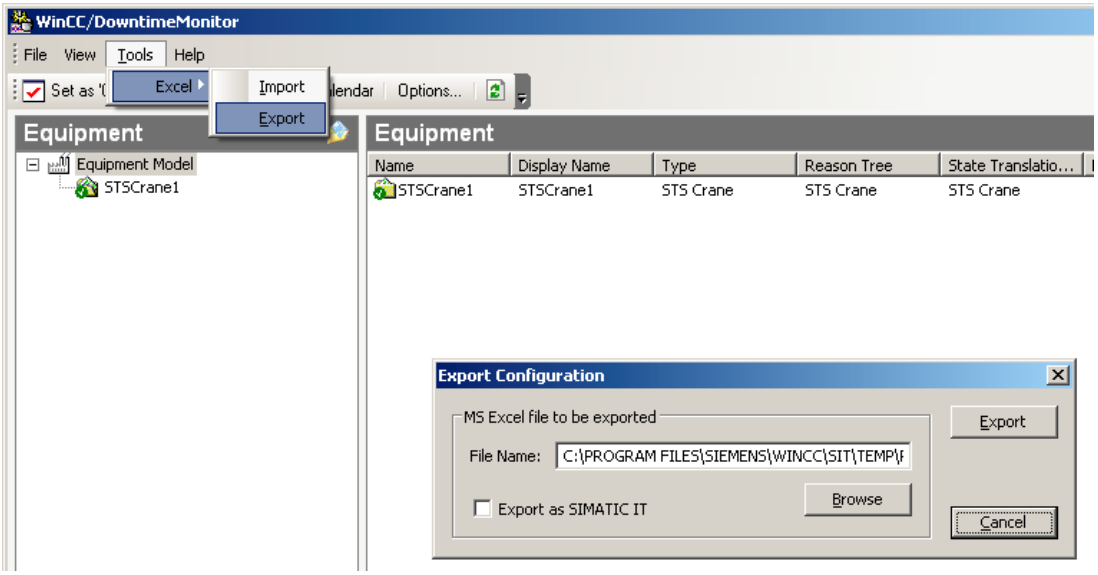


Figure 4-79 Exporting a project

4. Add your crane to the import file and close the file. Please observe the information in the DTM documentation on editing the spreadsheets. You can use the example equipment as a template.

Note

The name of the equipment must match the crane name defined in the CMS editor.

5. Import the project.
6. Activate the new DTM project version with "Set as Current".

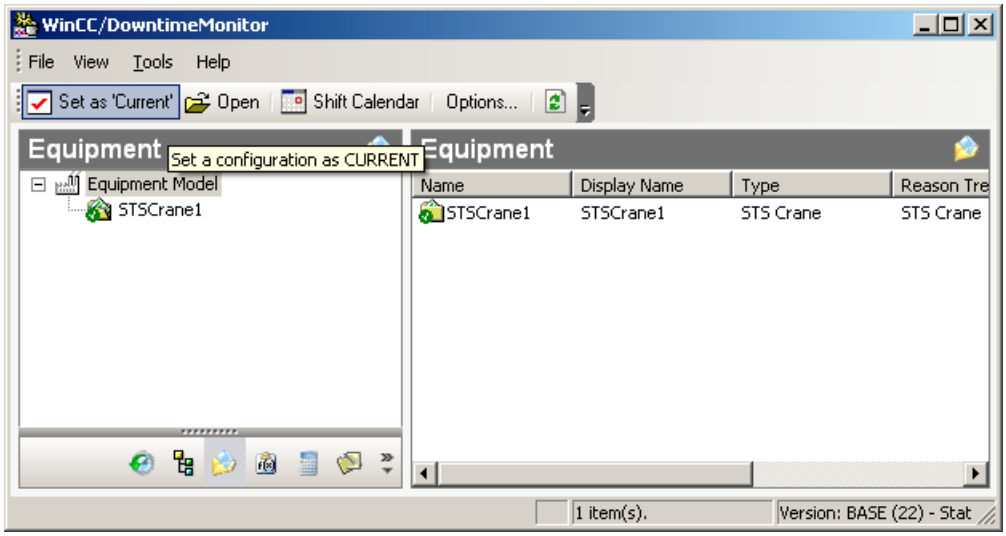


Figure 4-80 Activate the new DTM project version

4.4.9.6 Save configuration for KPI Control

Initial situation

The KPI control is a DTM control for displaying DTM data as a bar graph. You can control the display of data in the KPI control via script. Configurations are saved and can be called again for this purpose. In the application, several configurations are saved for a sample crane. You must replace the sample crane in the saved configurations by one of your cranes (e.g. "Crane4") as soon as you delete the sample crane in the DTM project.

You can find the saved data in an XML file (e.g. RCMS_V04_01_SP1.mcp_aui_dtmconfig.xml "") in the WinCC project path. The file has as prefix the name of the WinCC project (e.g. "RCMS_V04_01_SP1").

Processing steps – define crane

1. Open the tag group "Screens" in the WinCC tag management / internal tags.
2. Open the properties of the tags "@CMSConfigCrane".
3. Replace e.g. the first screen of the 4th menu ("Fault-Diagnostics" → "Messages.PDL") with a new screen (e.g. "MessageList.PDL").
4. In the starting value of the tags, enter the name of the crane that should be selected when runtime is started. Use this crane to also save your configurations for the KPI control (see the following section).

Processing steps – save configurations

1. Start the WinCC Runtime of the RCMS project.
2. Log on as Administrator in the CMS user interface.

3. Open the KPI chart screen. On the top edge of the screen you can see the buttons to select the configurations.

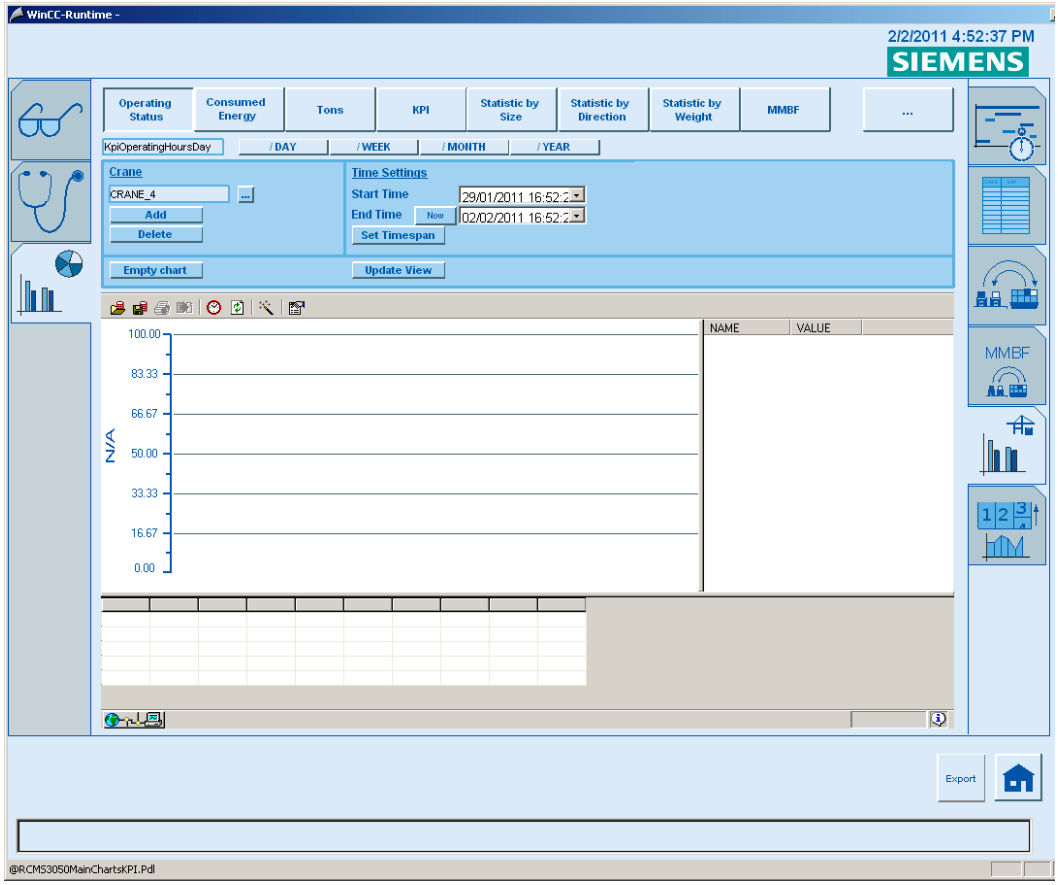


Figure 4-81 Loading configurations into the KPI control

4. For example, activate the "Operating state" / "Operating status" button.

   The "KpiOperatingHoursDay" configuration is loaded into the control. If the sample crane was previously deleted, then no data is displayed after loading.

5. Start the "Configuration wizard" of the KPI control from the toolbar of the control.

6. Under "Context Management", select one of your cranes (= equipment) (e.g. "STSCrane1").

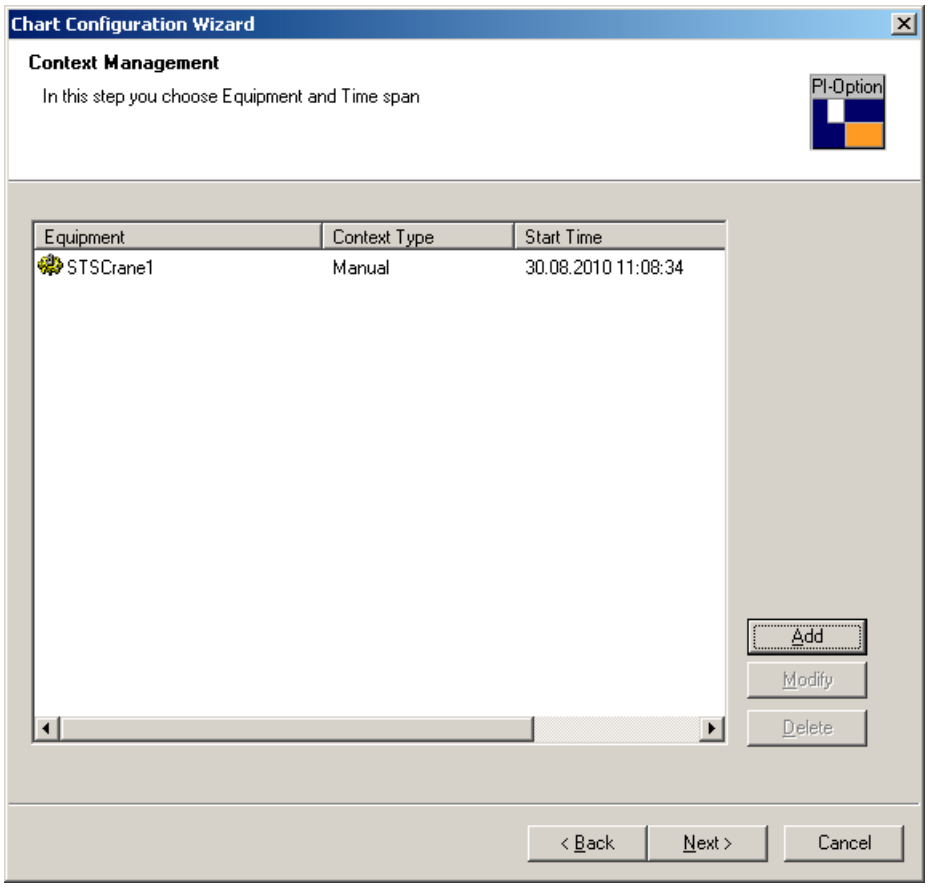


Figure 4-82 Select crane as DTM equipment in the wizard of the KPI control

7. Define your data and the grouping under "Query Type":

   You can keep the settings in the Query Type → Algorithms/Counter.

8. Under Query Type → Cluster Type, select the time intervals corresponding to the configuration loaded at the start (here: "KpiOperatingHoursDay")
   - KpiOperatingHoursDay → "ctByDays"
   - KpiOperatingHoursWeek → "ctByWeeks"
   - KpiOperatingHoursMonth → "ctByMonths" or "ctByCalendarMonths"
   - KpiOperatingHoursYear → "ctByYears" or "ctByCalendarYears"

9. Enter a value of "1" for "Value". When grouping the time interval according to days, each tag is displayed in the control as a bar.

10. Under sub-cluster type, select "ctByEquipmentIDs". As a result of the grouping according to cranes, data from several cranes are simultaneously displayed in the control.

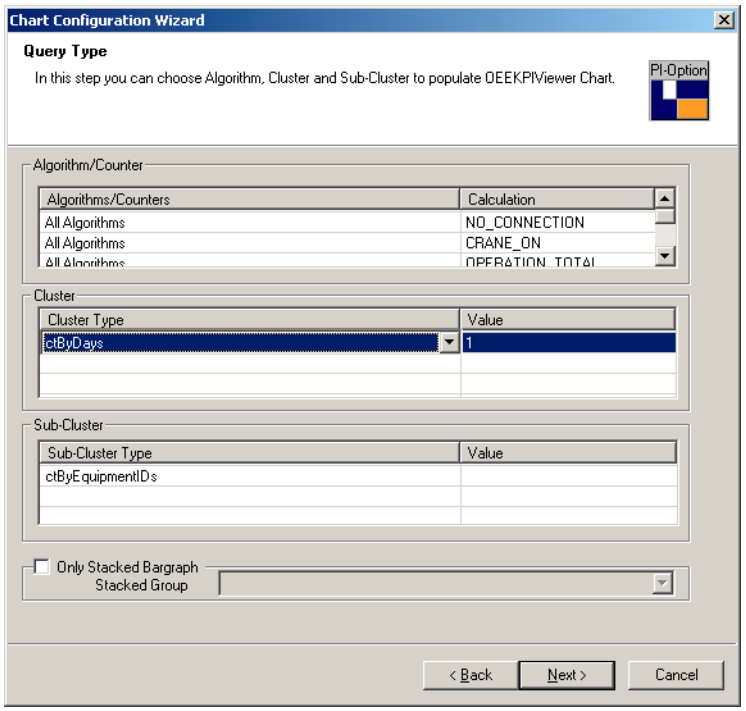


Figure 4-83 Select data in the wizard of the KPI control

11. Close the wizard. The actual configuration is displayed in the control.
12. Press the "…" button.

    The name of the configuration loaded at the start is displayed in the output field (e.g. "KpiOperatingHoursDay").
13. Save the actual configuration using the "Save view" button under the displayed name (e.g. KpiOperatingHoursDay).

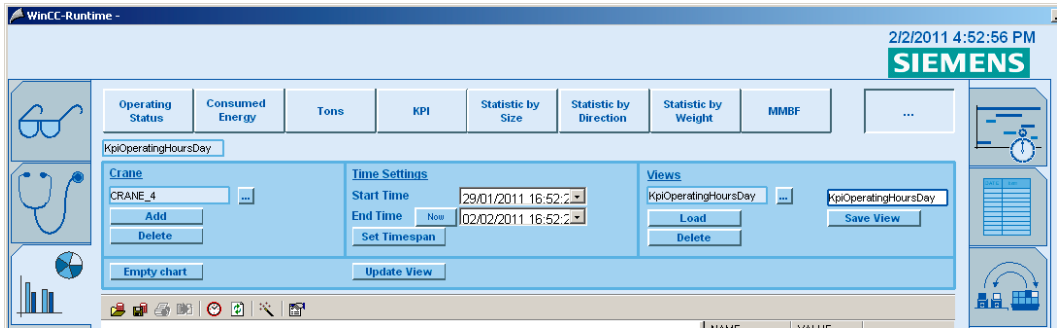


Figure 4-84 Save configuration for KPI control

14. Test the configuration by pressing the "Operating state" button.
15. Proceed in the same way for all of the other configurations. In so doing, for all of the configurations in the context management of the wizard, the same crane (e.g. "STSCrane1") must be selected.

    Note that for each data set there can be several time intervals (hour, day, week, month, year).

4.4.9.7 Saving the DTM project

Initial situation

The DTM project data is not automatically copied into the WinCC project. First of all, you need to export the data for each copy operation from the WinCC project. If you wish to remove the DTM project together with the WinCC project from a computer then after the export, you must delete the DTM project.

Processing steps – export project

1. Open WinCC Explorer.
2. Exit WinCC Runtime.
3. Open the project management tool (WinCC Explorer → PI_Option → Administrative Tools)
4. Export your DTM project via Tools → Export project.
5. Specify whether you only wish to backup the configuration database or also your saved runtime data.

Processing steps – delete project

1. Open the project management tool (WinCC Explorer → PI_Option → Administrative Tools).
2. Delete your DTM project via Tools → Delete project.

Planning and configuring 5

This chapter describes the configuration work you need to perform in the CMS standard application in order to adapt the standard application to your specific requirements. It describes configuration work which is specific to the CMS standard application. It is assumed that you are generally familiar with WinCC.

Specific elements of the CMS standard application are expansion of the screen structure, configuration of the CMS WinCC add-on, SIPLUS CMS, etc.

How to work with new languages and the options for configuring mass data are also described.

This chapter is, therefore, primarily aimed at people who are involved in adapting the standard application to their own project requirements.

Note

Note the design information provided in the appendix when undertaking configuration work.

5.1 Expansion of visualization and screen structure

5.1.1 Overview of screen structure and screen navigation

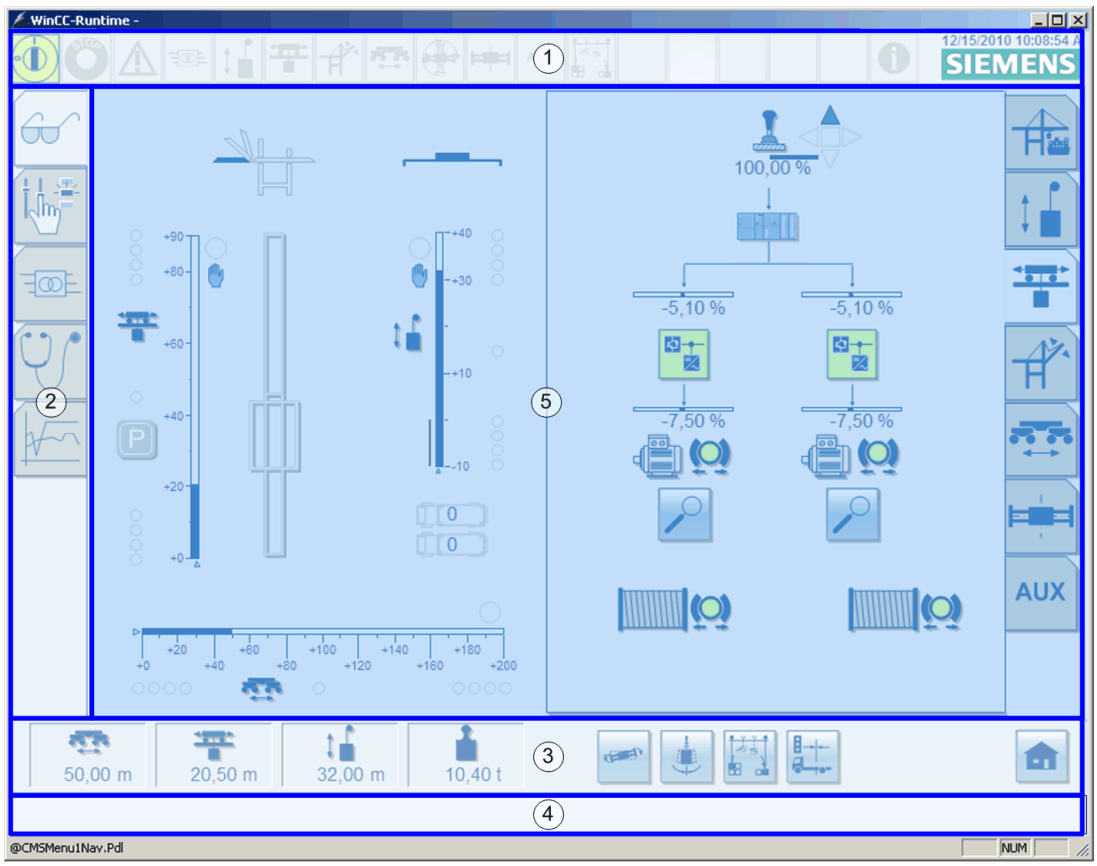
The screen structure of the CMS standard application consists of a fixed frame and variable screen contents. The screen contents are split into three navigation levels:

- Primary level (main menus of the user interface)
- Secondary level (screens within a main menu)
- Tertiary level (detailed views within screens)

The main screen of the CMS user interface simply consists of WinCC graphic objects "Picture Window". All permanently visible picture windows of the main screen are shown in the figure below (primary and secondary screen levels). Using the primary navigation bar ② you select between the menus shown in the menu window ⑦.

Group displays ①, message lines ④ and status bar windows ③ form the fixed screen frame and are not affected by navigation.

Detail windows and dialog windows (tertiary level) are not shown, as they are not usually visible in Runtime.



① Group display window
② Primary navigation window
③ Status bar window
④ Message line window
⑤ Menu window

Screen navigation is based on internal WinCC tags.

- Status tag: Status of navigation bars (Type Byte)
- Picture tag: Screen name of a picture window (Type Text-8)
- Display tag: Visibility of detail and dialog windows

A picture tag is assigned to each picture window with a dynamized picture name (Picture name property). The figure below illustrates how picture tags are used to switch between screens and how the three navigation levels are interconnected:

- The main screen is shown in ①. The menu window is colored blue, since it is a screen window with screen tags.
- The first button of the primary navigation is pressed in ②. The menu window is assigned to the main screen of the first menu via the picture tag. The main screen contains one or two picture windows and a navigation window. The first menu contains two picture windows and a navigation bar window for the secondary navigation. The secondary navigation dynamizes the picture tags of one of the picture windows.
- ③ indicates that the first button in the secondary navigation bar assigns a screen to the picture window (GeneralDiagnostics.Pdl).

The screens contain one or more magnifying glass pushbuttons. The magnifying glass button can be used to open a detail screen ④. When this happens, the display tag for the detail window is set to"TRUE" in the main screen and a picture name is assigned to the picture tag.

The same procedure applies to all the other menus.

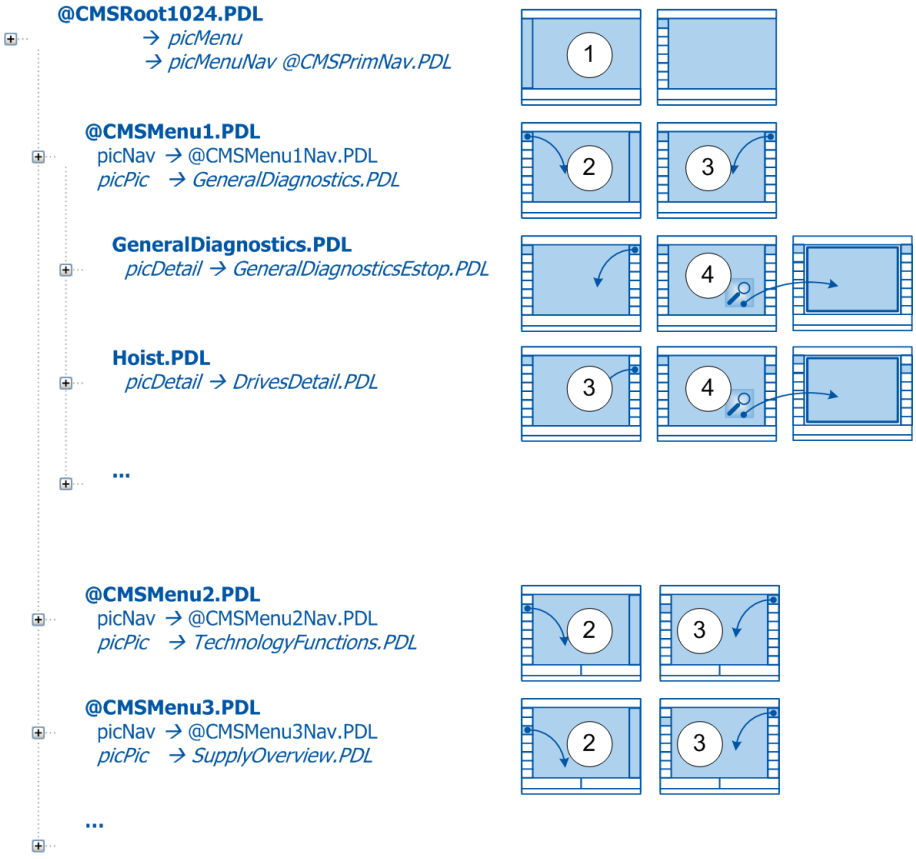


Figure 5-1 Principle of screen navigation

There is an internal tag for each navigation bar and this features the selection status of the entire navigation bar (selection status tag). The tag changes its value as soon as a button is pressed in the navigation bar. Every button is assigned a selection status where the button is active. The buttons are WinCC status displays (see next section).

5.1.2 Navigation bar

The following section describes how you can configure an element in a navigation bar.

Processing steps

1. Edit the two graphics in the EMF format for the button (active, inactive) in the navigation for calling up the screen.
2. Open the screen of a navigation bar (e.g. @CMSMenu1Nav.Pdl). The bar has eight buttons. The status tag @CMSMenu1Selection.PDL is assigned to the status of the navigation bar.
3. Select the next free button element (e.g. the eighth element "stdItem8"). Position 8 is assigned to bit position 7 of the status tag.
4. Open the status display configuration dialog. The button is filled with placeholder graphics. The state 128 (= bit position 7) is the active graphic, all other states are assigned to the inactive graphics.
5. Replace the placeholders with your own graphics for active and inactive.
6. Save your graphics under the name of the placeholder graphic in the project folder GraCs (e.g. PrimNavItem8Active, ...). This means that you do not have to make any changes in the Graphics Designer.

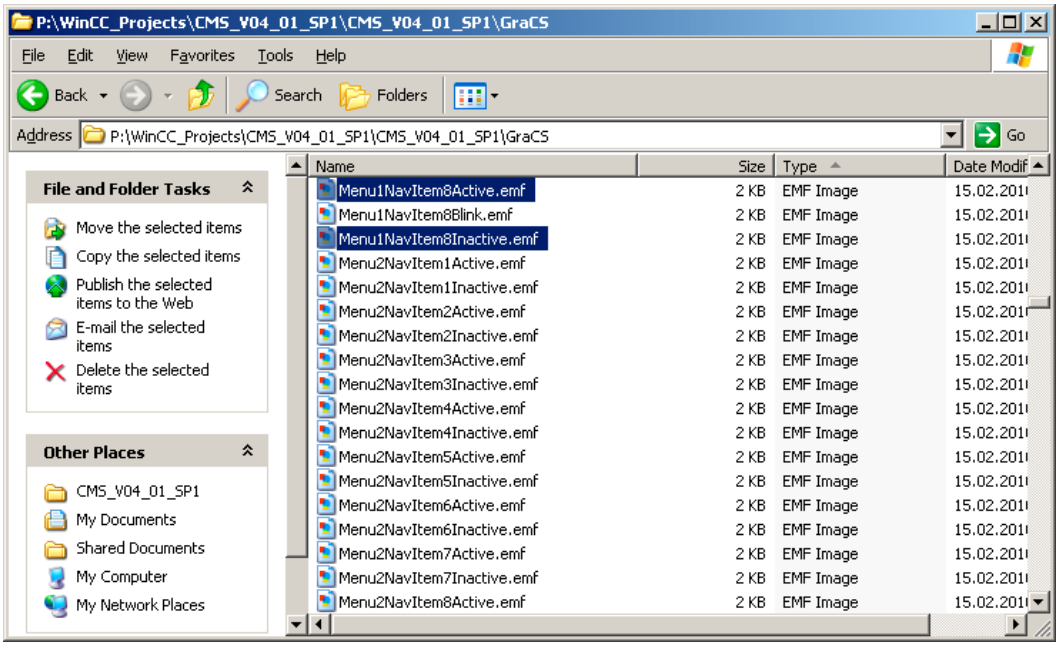

P:\WinCC_Projects\CMS_V04_01_SP1\CMS_V04_01_SP1\GraCS
File Edit View Favorites Tools Help
Back Search Folders
Address P:\WinCC_Projects\CMS_V04_01_SP1\CMS_V04_01_SP1\GraCS
Go
File and Folder Tasks
Move the selected items
Copy the selected items
Publish the selected items to the Web
E-mail the selected items
Delete the selected items
Other Places
CMS_V04_01_SP1
My Documents
Shared Documents
My Computer
My Network Places
Name Size Type Date Modif
Menu1NavItem8Active.emf 2 KB EMF Image 15.02.201
Menu1NavItem8Blink.emf 2 KB EMF Image 15.02.201
Menu1NavItem8Inactive.emf 2 KB EMF Image 15.02.201
Menu2NavItem1Active.emf 2 KB EMF Image 15.02.201
Menu2NavItem1Inactive.emf 2 KB EMF Image 15.02.201
Menu2NavItem2Active.emf 2 KB EMF Image 15.02.201
Menu2NavItem2Inactive.emf 2 KB EMF Image 15.02.201
Menu2NavItem3Active.emf 2 KB EMF Image 15.02.201
Menu2NavItem3Inactive.emf 2 KB EMF Image 15.02.201
Menu2NavItem4Active.emf 2 KB EMF Image 15.02.201
Menu2NavItem4Inactive.emf 2 KB EMF Image 15.02.201
Menu2NavItem5Active.emf 2 KB EMF Image 15.02.201
Menu2NavItem5Inactive.emf 2 KB EMF Image 15.02.201
Menu2NavItem6Active.emf 2 KB EMF Image 15.02.201
Menu2NavItem6Inactive.emf 2 KB EMF Image 15.02.201
Menu2NavItem7Active.emf 2 KB EMF Image 15.02.201
Menu2NavItem7Inactive.emf 2 KB EMF Image 15.02.201
Menu2NavItem8Active.emf 2 KB EMF Image 15.02.201

Figure 5-2 Replacing placeholder graphics

7. Open the direct connection of the event – "press left" – and assign the WinCC screen which you would like to call up using this button to the screen tag "@CMSMenu1Pic".

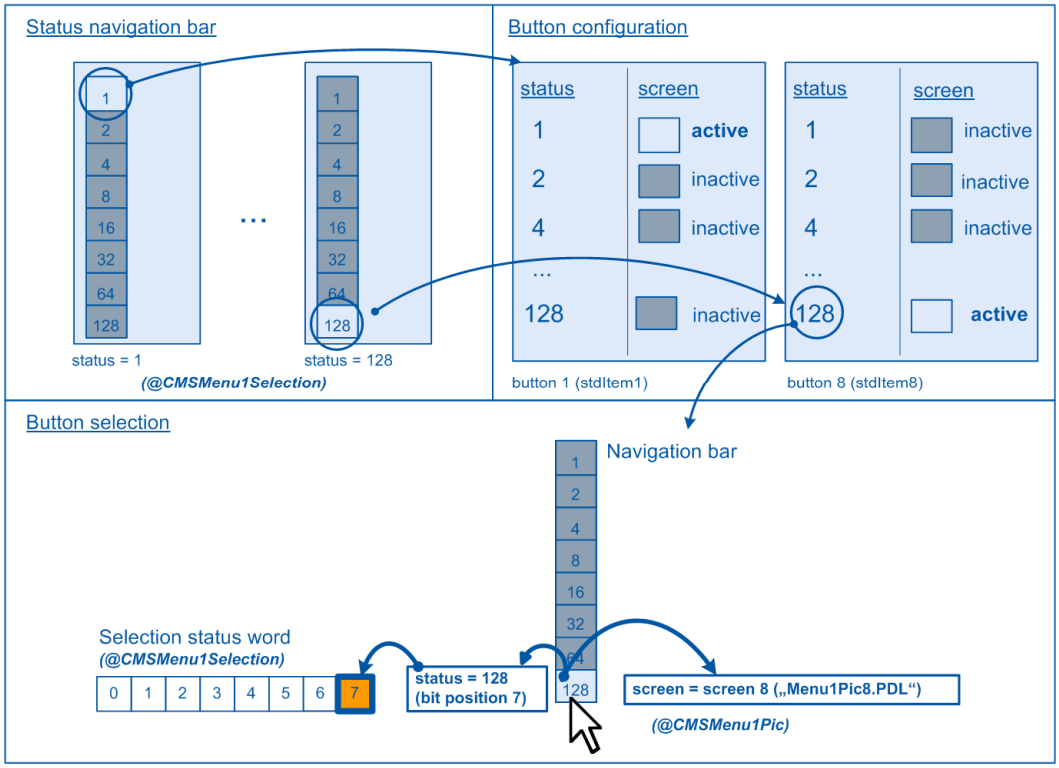


Figure 5-3 Button of a navigation bar

5.1.3 Inserting a new menu at the primary level

Initial situation / objective

The first section of this chapter described the fundamental screen structure and screen navigation concept. According to this description, you will need the following elements to insert a new menu:

- 1 button in the primary navigation bar ①
- 1 menu screen with picture window for the menu elements and the secondary navigation ②
- 1 picture tag for the picture window in the menu screen ⑤
- 1 screen for the secondary navigation with 0-8 buttons ③

- 1 status tag for the secondary navigation bar ⑥
- 1-8 graphics (menu elements) for each button ④

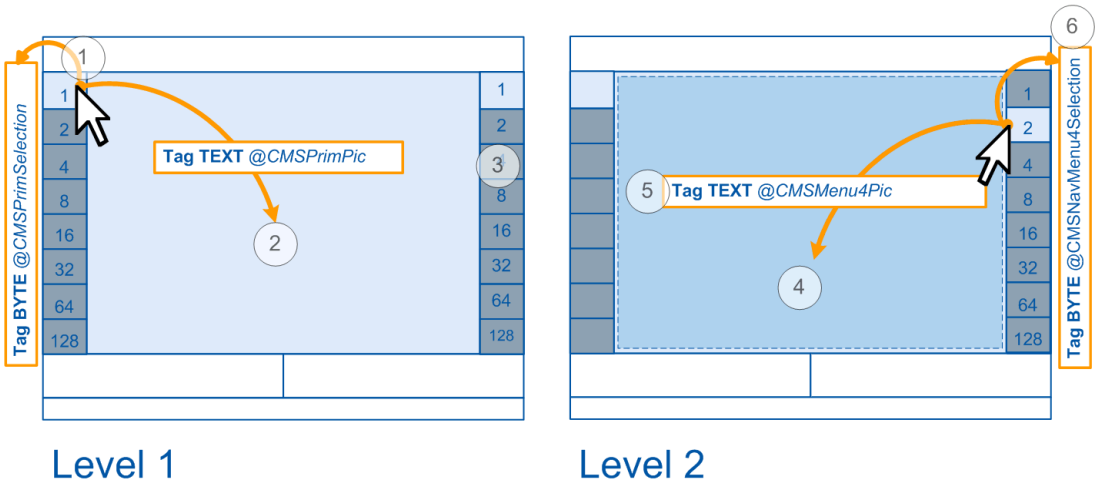


Figure 5-4 Inserting a menu into the screen navigation

The CMS standard application already has eight menus. Existing menus can be replaced by new menus, however, as required. The following example is based on the RCMS application. For each menu, there are sufficient placeholders for you to use.

Processing steps – renaming placeholders

1. Allocate appropriate names to the menu screens (e.g. "Menu4Pic4.PDL").
2. Open the navigation screen. The screen contains eight buttons with placeholder images.
3. Open the events of the fourth button. In the direct connection of the event – "press left" – assign the picture tag ("@CMSMenu4Pic").
4. Proceed in the same way for all the other buttons.

Processing steps – button in the primary navigation bar

1. Edit two graphics in EMF format for the button (active, inactive) in the primary navigation for calling up the menu.
2. Open the primary navigation bar (@CMSPrimNav.PDL).
3. Open the configuration dialog of the button of your placeholder menu (e.g. stdItem4).

4. Replace the placeholder graphics in EMF format with your own graphics.
5. Save your graphics under the name of the placeholder graphic in the project folder GraCs (e.g. PrimNavItem4Active, ...). This means that you do not have to make any changes in the Graphics Designer.

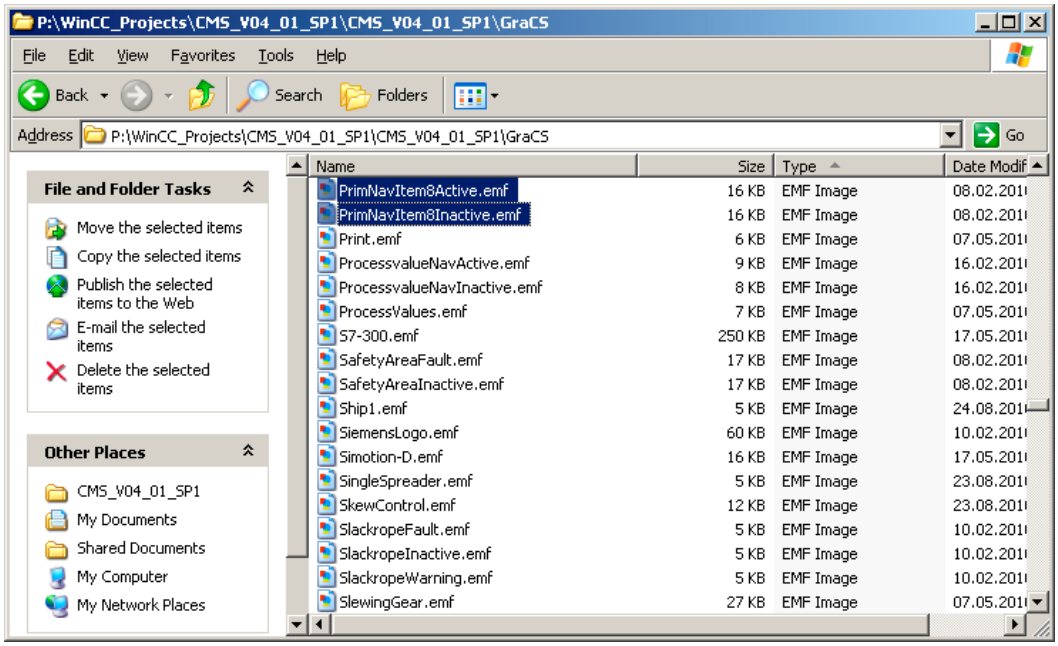

P:\WinCC_Projects\CMS_V04_01_SP1\CMS_V04_01_SP1\GraCS
File Edit View Favorites Tools Help
Back Search Folders
Address P:\WinCC_Projects\CMS_V04_01_SP1\CMS_V04_01_SP1\GraCS
Go
File and Folder Tasks
Move the selected items
Copy the selected items
Publish the selected items to the Web
E-mail the selected items
Delete the selected items
Other Places
CMS_V04_01_SP1
My Documents
Shared Documents
My Computer
My Network Places
Name Size Type Date Modif
PrimNavItem8Active.emf 16 KB EMF Image 08.02.201
PrimNavItem8Inactive.emf 16 KB EMF Image 08.02.201
Print.emf 6 KB EMF Image 07.05.201
ProcessvalueNavActive.emf 9 KB EMF Image 16.02.201
ProcessvalueNavInactive.emf 8 KB EMF Image 16.02.201
ProcessValues.emf 7 KB EMF Image 07.05.201
S7-300.emf 250 KB EMF Image 17.05.201
SafetyAreaFault.emf 17 KB EMF Image 08.02.201
SafetyAreaInactive.emf 17 KB EMF Image 08.02.201
Ship1.emf 5 KB EMF Image 24.08.201
SiemensLogo.emf 60 KB EMF Image 10.02.201
Simotion-D.emf 16 KB EMF Image 17.05.201
SingleSpreader.emf 5 KB EMF Image 23.08.201
SkewControl.emf 12 KB EMF Image 23.08.201
SlackropeFault.emf 5 KB EMF Image 10.02.201
SlackropeInactive.emf 5 KB EMF Image 10.02.201
SlackropeWarning.emf 5 KB EMF Image 10.02.201
SlewingGear.emf 27 KB EMF Image 07.05.201

Figure 5-5 Replacing placeholder graphics

Processing steps – buttons in the secondary navigation bar

1. Edit two graphics in EMF format per button (active, inactive) in the secondary navigation.
2. Open the secondary navigation bar (@CMSMenu4Nav).
3. Open the configuration dialog of the first button.
4. Replace the placeholder graphics in EMF format with your own graphics.
5. Save your graphics under the name of the placeholder graphic in the project folder GraCs (e.g. PrimNavItem4Active, ...). This means that you do not have to make any changes in the Graphics Designer.

Result

You have added a new menu to the CMS user interface or modified a menu. The new menu and associated secondary navigation bar is opened using the corresponding button in the primary navigation bar.

5.1.4 Screen initialization

Initial situation / objective

Screen navigation is based on internal WinCC tags. The navigation tags must be initialized when starting runtime or if the user logs off.

Initialization takes place using the project function "InitScreens.fct". The header file "Screens.H" is read in order to define the tags. The following initializations are carried out in the standard application:

- The selection state for all navigations is set to '0'.
- The picture tags of the main navigation and of the individual menus are initialized in the starting value of the picture tags with the name of the first screen in the menu.

How to change the screen initialization is described below.

Processing steps

1. Open the tag group "Screens" in the WinCC tag management / internal tags.
2. Open the properties of a picture tag (e.g. @CMSMenu4Pic).
3. In the Start value of the tags, replace e.g. the first screen of the 4th menu ("Fault-Diagnostics" → "Messages.PDL") with a new screen, e.g. "MessageList.PDL".
4. Save the change.

5.1.5 Group fault bar

Initial situation / objective

The state of the group fault bar is formed via group messages in the WinCC Alarm Logging (see section Group messages (Page 84)).

Each element in the group fault bar has three possible states

- Bit 1: Inactive (not a fault, not a warning)
- Bit 2: Warning
- Bit 3: Fault

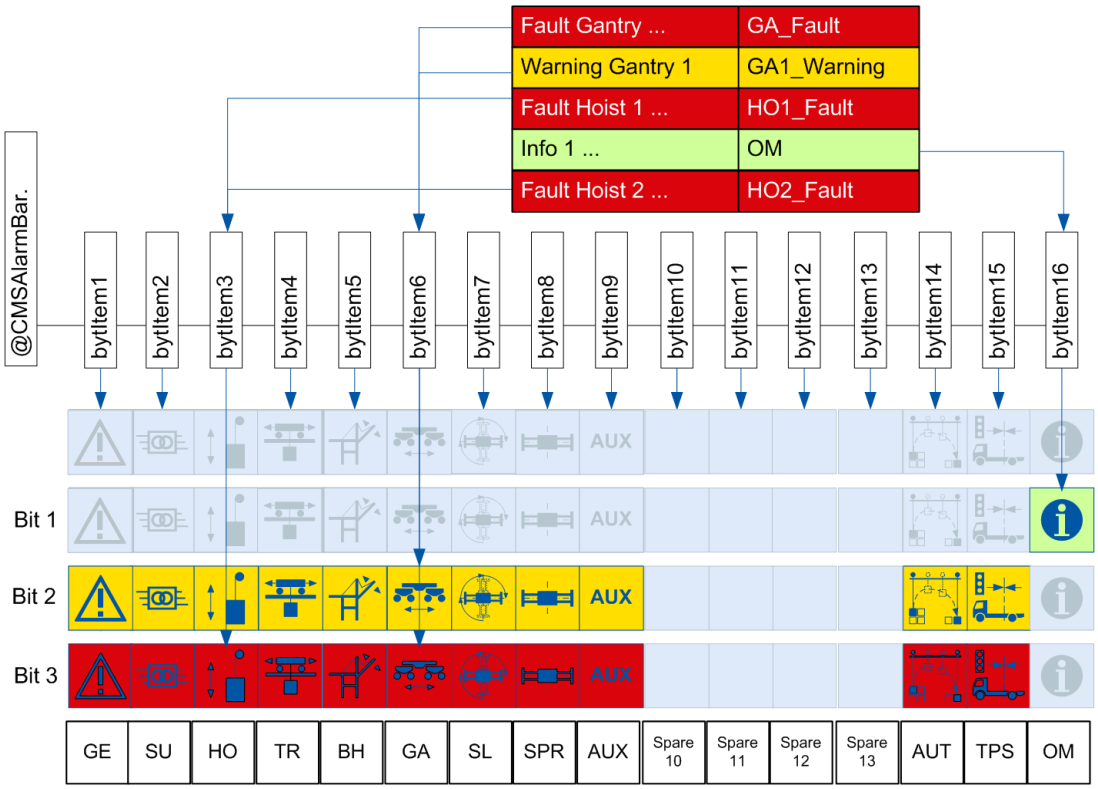


Figure 5-6 Principle of the group fault display

There are only two states for operating messages:

- Inactive
- Active

How to add a further element to the group display is described below.

Processing steps

1. Edit three graphics in the EMF format for the display element (inactive, warning, error/fault) and copy the generated graphics into the project folder <<WinCCProjectpath>>\GraCS with the name of a placeholder, e.g. "GroupMessagesItem10Inactive.emf", GroupMessagesItem10Warning.emf", GroupMessagesItem10Fault.emf".

2. Copy the graphics into the GraCs folder of the WinCC project and replace the existing placeholder graphics.

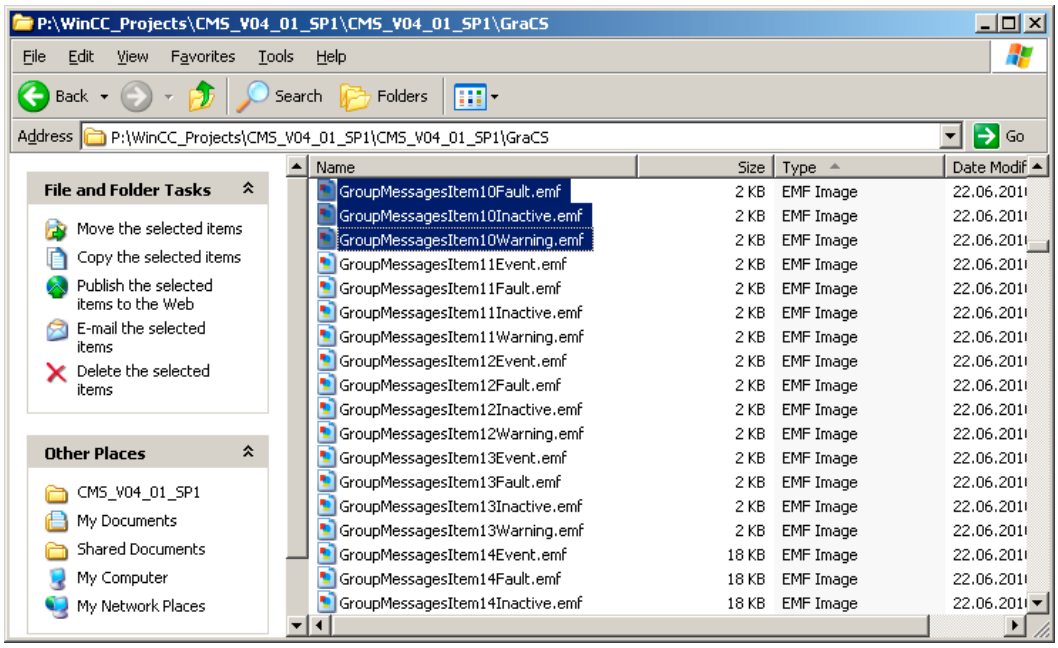

P:\WinCC_Projects\CMS_V04_01_SP1\CMS_V04_01_SP1\GraCS
File Edit View Favorites Tools Help
Back Search Folders
Address P:\WinCC_Projects\CMS_V04_01_SP1\CMS_V04_01_SP1\GraCS
Go
File and Folder Tasks
Move the selected items
Copy the selected items
Publish the selected items to the Web
E-mail the selected items
Delete the selected items
Other Places
CMS_V04_01_SP1
My Documents
Shared Documents
My Computer
My Network Places
Name Size Type Date Modif
GroupMessagesItem10Fault.emf 2 KB EMF Image 22.06.201
GroupMessagesItem10Inactive.emf 2 KB EMF Image 22.06.201
GroupMessagesItem10Warning.emf 2 KB EMF Image 22.06.201
GroupMessagesItem11Event.emf 2 KB EMF Image 22.06.201
GroupMessagesItem11Fault.emf 2 KB EMF Image 22.06.201
GroupMessagesItem11Inactive.emf 2 KB EMF Image 22.06.201
GroupMessagesItem11Warning.emf 2 KB EMF Image 22.06.201
GroupMessagesItem12Event.emf 2 KB EMF Image 22.06.201
GroupMessagesItem12Fault.emf 2 KB EMF Image 22.06.201
GroupMessagesItem12Inactive.emf 2 KB EMF Image 22.06.201
GroupMessagesItem12Warning.emf 2 KB EMF Image 22.06.201
GroupMessagesItem13Event.emf 2 KB EMF Image 22.06.201
GroupMessagesItem13Fault.emf 2 KB EMF Image 22.06.201
GroupMessagesItem13Inactive.emf 2 KB EMF Image 22.06.201
GroupMessagesItem13Warning.emf 2 KB EMF Image 22.06.201
GroupMessagesItem14Event.emf 18 KB EMF Image 22.06.201
GroupMessagesItem14Fault.emf 18 KB EMF Image 22.06.201
GroupMessagesItem14Inactive.emf 18 KB EMF Image 22.06.201

Figure 5-7 Editing the status graphics of a group display

3. Remember the name of the status tag that is connected with this display.

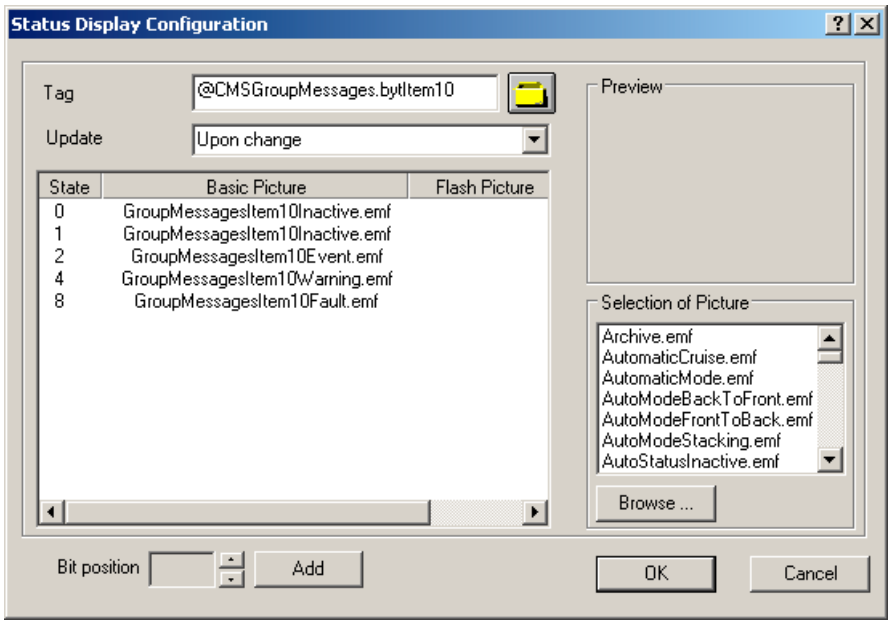


Figure 5-8 Status tag of a group display

4. In the Alarm Logging editor under "Group Messages" → "User-defined", open the two placeholder group messages with the same number as the group display.
   - For example, "Spare10_Fault" → Group message for fault messages (Class 1)
   - For example, "Spare10_Warning" → Group message for warnings (Class 4)

5. Link bit 3 of the group display status tag with the group message for fault messages.

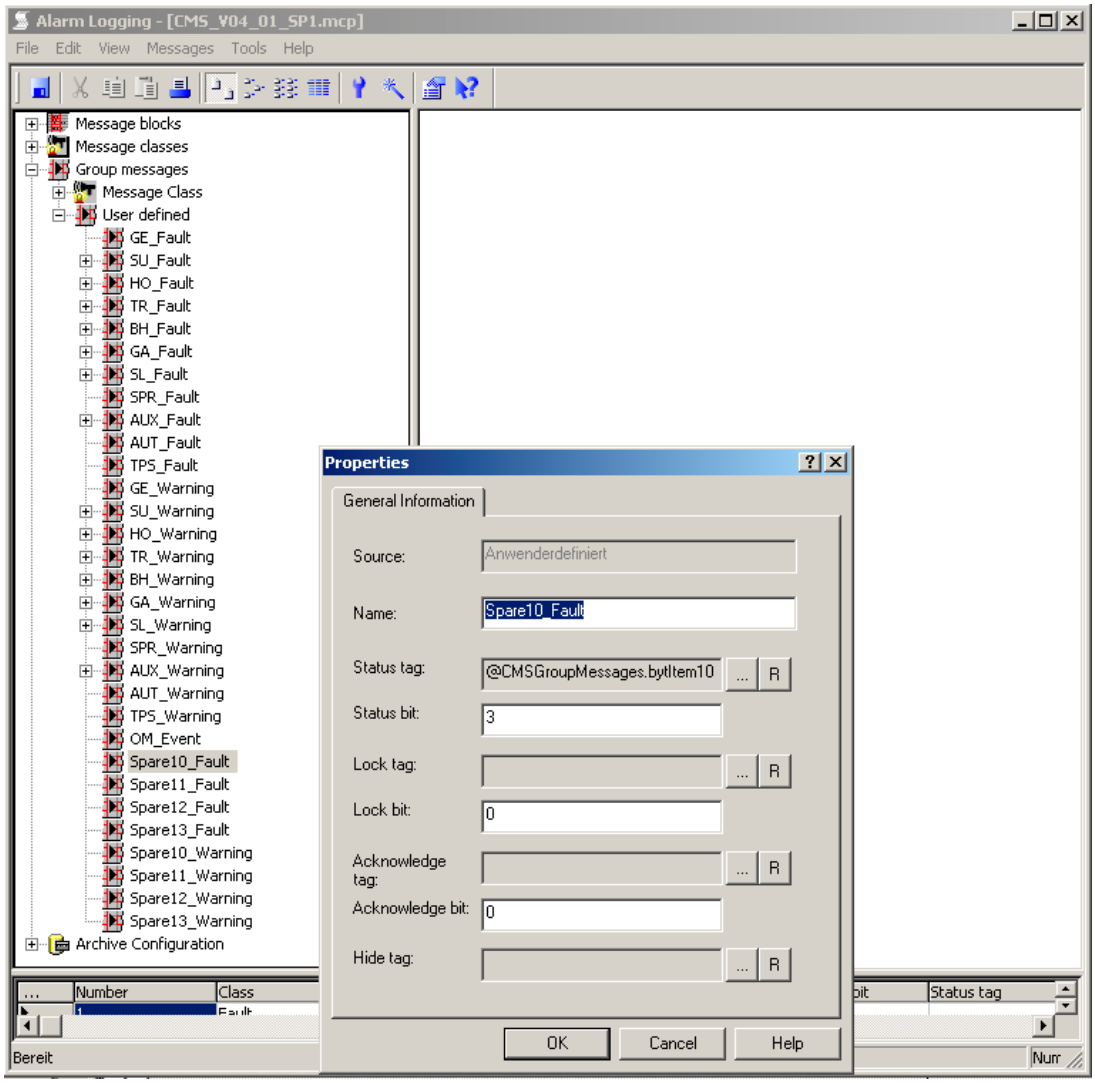


Figure 5-9 Status tag of the group message

6. Link bit 2 of the group display status tags with the group message for warnings.

Note

You can also organize the group messages hierarchically. The lower-level messages can also trigger the higher-level group message.

5.1.6 Message filters

In the CMS standard application, the messages are displayed in the WinCC Alarm Control. The messages displayed can be filtered according to various criteria in the CMS standard application using predefined buttons on a filter bar.

The filter buttons transmit an SQL filter string to the WinCC Alarm Control property "MsgFilterSQL". The reset button transmits an empty string to the control.

You will find the filter bar on the "MessagesFilter.PDL" screen. The following filter strings are available in the standard application:

Symbol	Name	Filter string	Description
	Fault	"CLASS=1"	Only messages of message class 1 → Fault
	Warnings	"CLASS=4"	Only messages of message class 4 → Warning
	General	"TEXT8 LIKE 'GE'"	Only messages with the group abbreviation "GE" in the user text block 8.
	Hoisting gear	"TEXT8 LIKE 'HO"	Only messages with the group abbreviation "HO" in the user text block 8.
	Trolley	"TEXT8 LIKE 'TR"	Only messages with the group abbreviation "TR" in the user text block 8.
	Boom-hoist	"TEXT8 LIKE 'BH"	Only messages with the group abbreviation "BO" in the user text block 8.
	Gantry	"TEXT8 LIKE 'GA"	Only messages with the group abbreviation "GA" in the user text block 8.
	Spreader	"TEXT8 LIKE 'SPR"	Only messages with the group abbreviation "SPR" in the user text block 8.
	Reset Filter	""	The filter is reset.

5.1.7 Additional message information in the CMSFaults control

Initial situation

Additional information is displayed using CMSFaults Control, which is installed with the CMS WinCC add-on. Here, alongside the stored maintenance instructions and references, you can display all the information from the message blocks which cannot be displayed in the Alarm Control due to lack of space. The display of information is based on the selection of a message number in the WinCC Alarm Control.

The CMS Faults Control is already integrated in the CMS standard application. Message numbers and message timestamps for the currently selected message are read out using a VBS project module. Depending on the message number, the information assigned to this message in the WinCC Alarm Logging and CMS editor is displayed. You will find the integrated CMSFaults Control on the "MessagesInfo.Pdl" screen.

CMSFaults Control consists of three tabs:

- Tab 1: "Details"

  Displays the message details in tabular form. The information comes from the message blocks in the WinCC Alarm Logging.

- Tab 2: "Maintenance instructions"

  Displays the maintenance instruction assigned to the message. The user may be offered up to six fields. Three fields for displaying the instructions created in the CMS editor, four fields for entering remarks.

- Tab 3: "References"

  Displays the references assigned to the message. In the standard application, this tab is only released for user authorization "102 CMS Maintenance" and above.

Please observe the following if you wish to use the CMSFaults Control in a separate screen:

Processing steps

1. Insert the CMSFaults Control into the screen using the object pallet → "Controls". You will find the control under "Siemens CMSFaults Control".

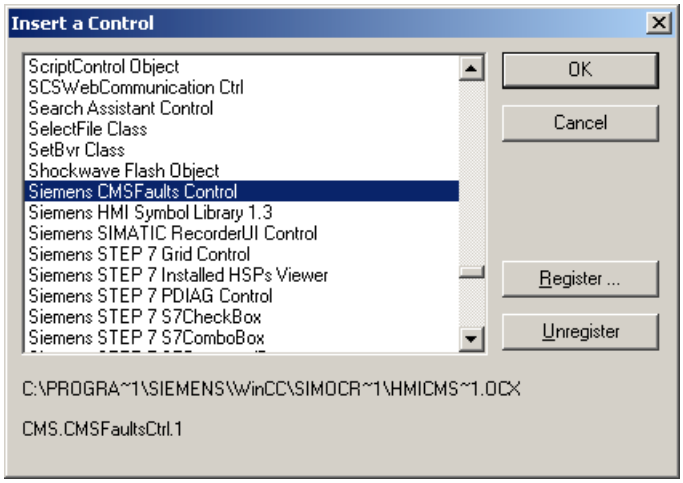


Figure 5-10 Insert the CMSFaults Control in the WinCC graphics designer

2. Open the object properties of the CMSFaults Control.
3. Add the name of your computer to the "Servername" property. You need to dynamize the property with the "@ServerName" WinCC system tag, if CMSFaults Control is to function with the web clients as well.
4. Transfer the message number of the currently selected message in the WinCC Alarm Control to the property "WinCCMessageNumber" of the CMSFaults Control. You can also use the VBS project module "GetSelectedMessageNumber.bmo" to read out the message number and message timestamp.

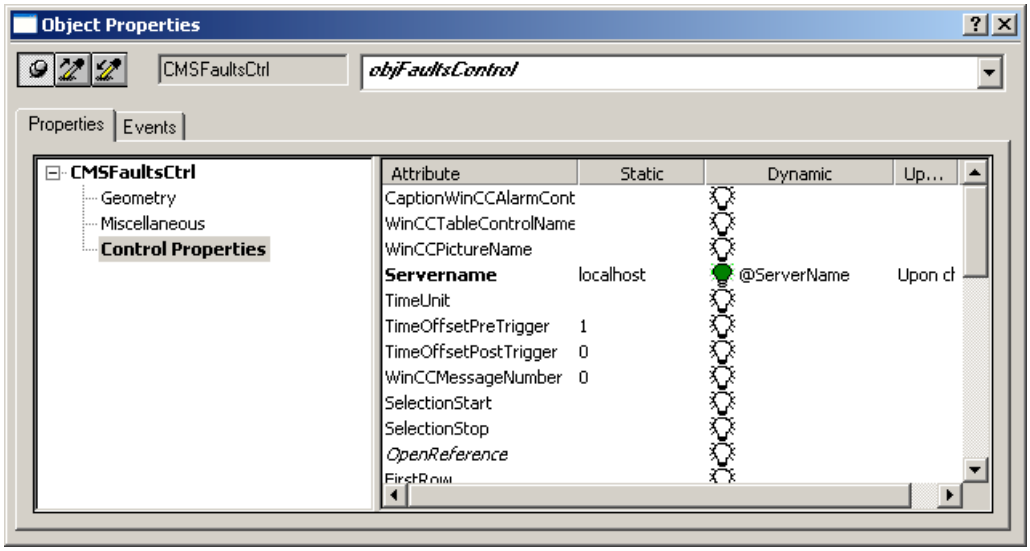


Figure 5-11 CMSFault Control object properties

5. Open the properties of the CMSFaults Control by double-clicking.
6. You can make changes to the colors displayed in the "Colors" tab.

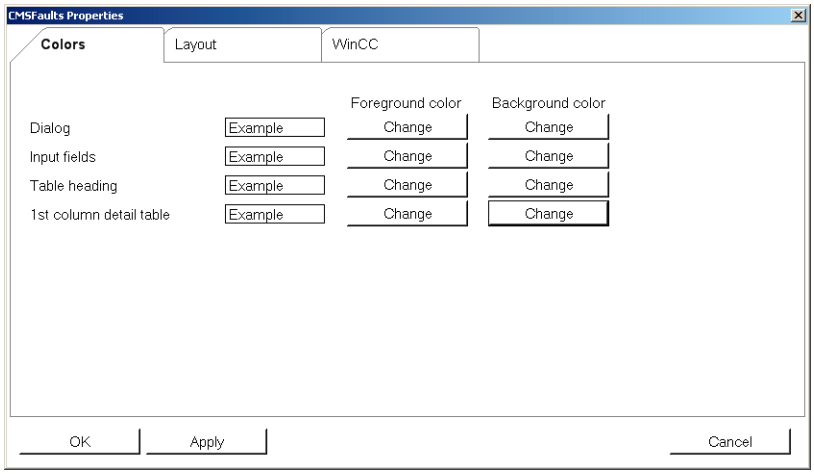


Figure 5-12 CMSFaults Control, "Colors" tab

7. In the "Layout" tab you can activate or deactivate the display of the three tabs, and you can block the option for entering remarks for the maintenance instructions.

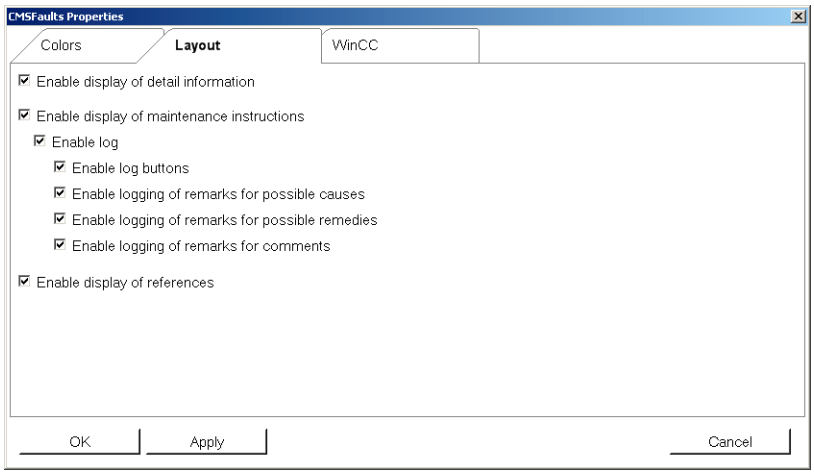


Figure 5-13 CMSFaults Control, "Layout" tab

8. Open the CMS editor.
9. Open the "Message Details" tab under "System" → "Basic settings".
10. In the "Sequence" field you can configure the order of information in the "Details" tab in the CMSFaults Control. The lower the value entered, the further up the list the information is.
11. Activate/deactivate the display of information in the "Details" tab in the CMSFaults Control using the "Display" check box.

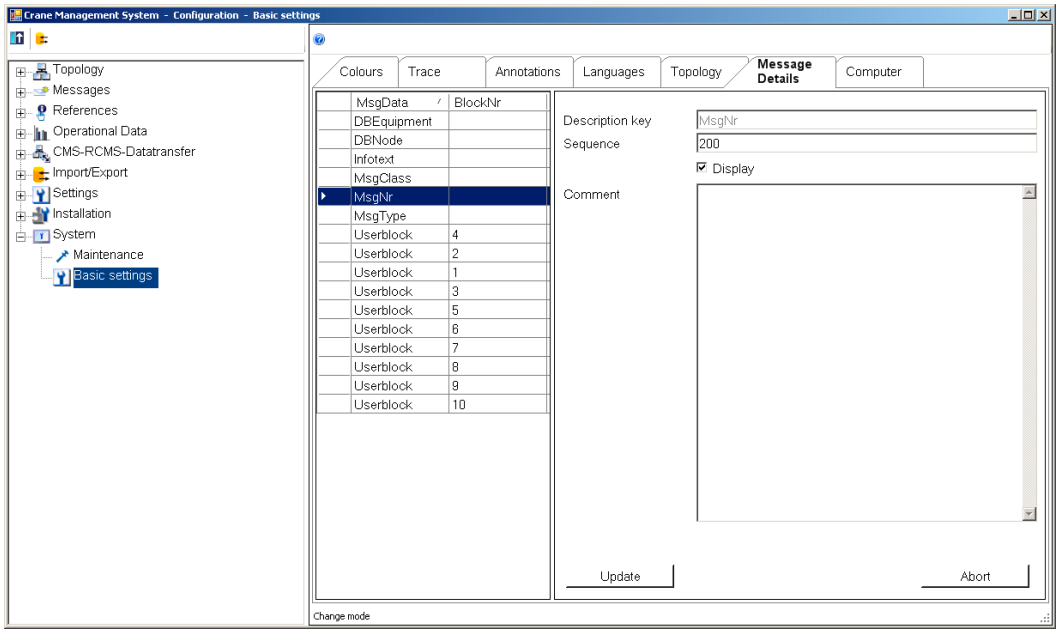


Figure 5-14 Configuring message details in the CMS editor

5.1.8 Integrate the tree view into the RCMS application

In the RCMS application, the connected cranes of a terminal are visualized using a hierarchic tree structure. The display groups the cranes according to equipment types and displays the operating state of a crane. See figure below.

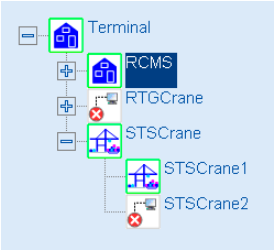


Figure 5-15 CMSNodeTree

This tree view is displayed by an ActiveX Control, the CMSNodeTree Control.

The tree topology is defined in the CMS editor under "Topology".

The CMSNodeTree Control is already integrated in the RCMS standard application. You can find the integrated CMSFaults Control e.g. in the @CMSHome.Pdl screen. Here, the information from the properties of the controls is used to display terminal statistics.

Please note the following if you wish to use the CMSNodeTree Control in a separate screen:

Processing steps

1. Insert the CMSNodeTree Control into the screen using the object pallet → "Controls".

   You will find the control under "Siemens CMSNodeTree Control".

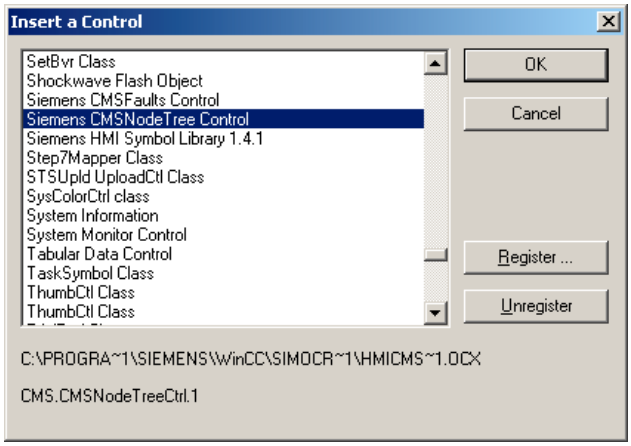


Figure 5-16 Insert the CMSNodeTree Control in the WinCC graphics designer

2. Open the object properties of the CMSFaults Control.

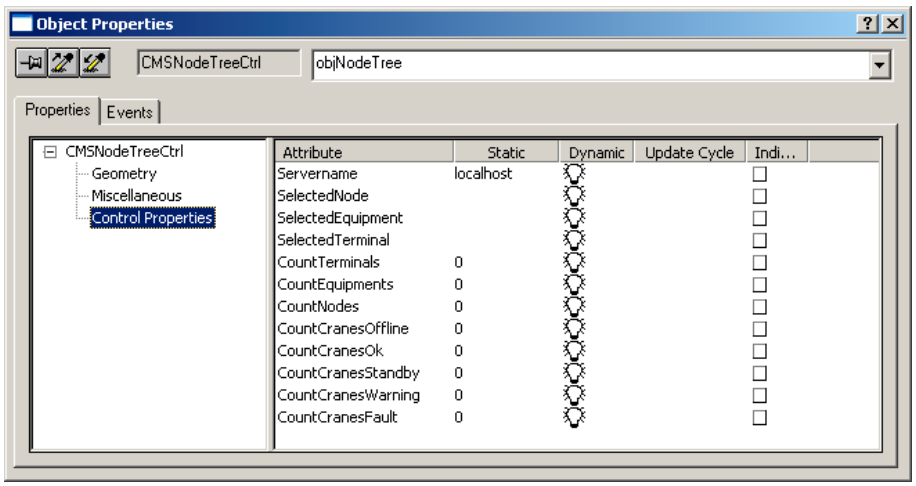


Figure 5-17 Properties of the CMSNodeTree Control

3. Add the name of your computer to the "Servername" property. You need to dynamize the property with the "@ServerName" WinCC system tag, if CMSNodeTree Control is to work with the Web clients as well.
   - The property "SelectedNode" contains the name of the selected crane. Dynamize the property "SelectedNode" with the name of the crane to be selected, in order to open the branch of the tree view in which the crane is located.
   - The property "SelectedEquipment" contains the name of the equipment type to which the selected crane belongs.
   - The property "SelectedTerminal" contains the name of the terminal to which the selected crane belongs.

   The following properties contain statistical information on the topology of the cranes listed.

Information	Function
CountTerminals	Contains the total number of available terminals.
CountEquipments	Contains the total number of equipment types in the terminal selected.
CountNodes	Contains the total number of nodes for the terminal or equipment type selected.
CountCranesOffline	Contains the number of nodes for the terminal or equipment type selected with the status "Offline".
CountCranesOk	Contains the number of nodes for the terminal or equipment type selected with the status "Ok".
CountCranesStandby	Contains the number of nodes for the terminal or equipment type selected with the status "Standby".
CountCranesWarning	Contains the number of nodes for the terminal or equipment type selected with the status "Warning".
CountCranesAlarm	Contains the number of nodes for the terminal or equipment type selected with the status "Alarm".

1. Open the object properties of the control.

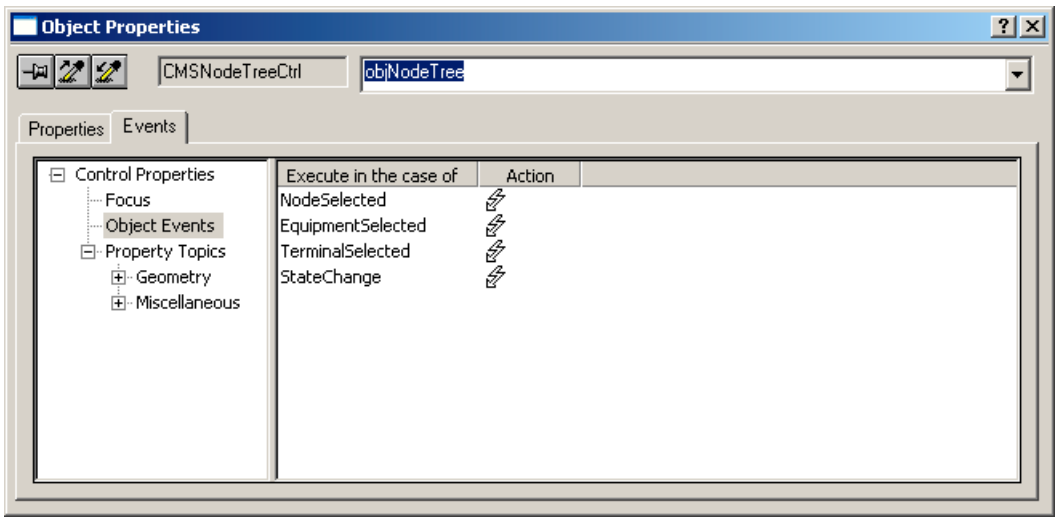


Figure 5-18 Events of the CMSNodeTree Control

2. Configure an action for the event "NodeSelected".

   The action is initiated as soon as you select a crane in the tree view.

3. Configure an action for the event "EquipmentSelected".

   The action is initiated as soon as you select an equipment type in the tree view.

4. Configure an action for the event "TerminalSelected".

   The action is initiated as soon as you select a terminal in the tree view.

Note

For additional details on the configuration of the CMSNodeTree control, you can refer to the operating instructions of the SIMOCRANE CMS WinCC add-on.

5.2 User groups

Four user types with different rights are configured in the WinCC User Administrator in the standard applications; see User groups (Page 23).

Table 5- 1 Default WinCC user types in the standard applications

Name	Password	Logon	Rights in the WinCC User Administrator
Operator	Operator	• CMS / RCMS: possible • Web client: possible	• Screen changeover • Restricted scope of navigation • Operation of sub-system screens
Maintenance	Maintenance	• CMS / RCMS: possible • Web client: possible	• Screen changeover • Minimum restricted scope of navigation • Operation of sub-system screens • Counter reset • PLC Reference
Management	Management	• CMS / RCMS: possible • Web client: possible	• Screen changeover • Minimum restricted scope of navigation • Operation of sub-system screens
Administrator	Administrator	• CMS / RCMS: possible • Web client: possible	Unrestricted rights: • Screen changeover • Unrestricted scope of navigation • Operation of sub-system screens • Counter reset • Make basic settings • Terminating the WinCC Runtime

When a user logs on in the CMS standard application, an internal authorization tag is initially set to "1". This tag controls whether the user can see user-specific elements in the user interface.

On the WinCC start page, standard WinCC functions are used to log on.

5.2.1 Changing passwords

Initial situation / objective

Passwords can be changed in the WinCC User Administrator. The old password must be known.

Processing steps

1. Open the WinCC User Administrator.
2. You can change the password in the toolbar under "User" → "Change password".

5.2.2 Automatic user log-off

Initial situation

An automatic log-off function is available in the CMS standard application, but is not activated.

Automatic user log-off is a standard function of WinCC. A global action in the CMS standard application ensures that

- The corresponding internal user tag is reset to "0".
- The standard user is logged on.
- Navigation is reset to the initial situation.

Processing steps

1. Open the WinCC User Administrator.
2. Select the user for whom you want to set up automatic log-off on the left.

3. Under "Automatic logout" in the field "after" … "minutes", enter the number of minutes after which the user is to be logged off.

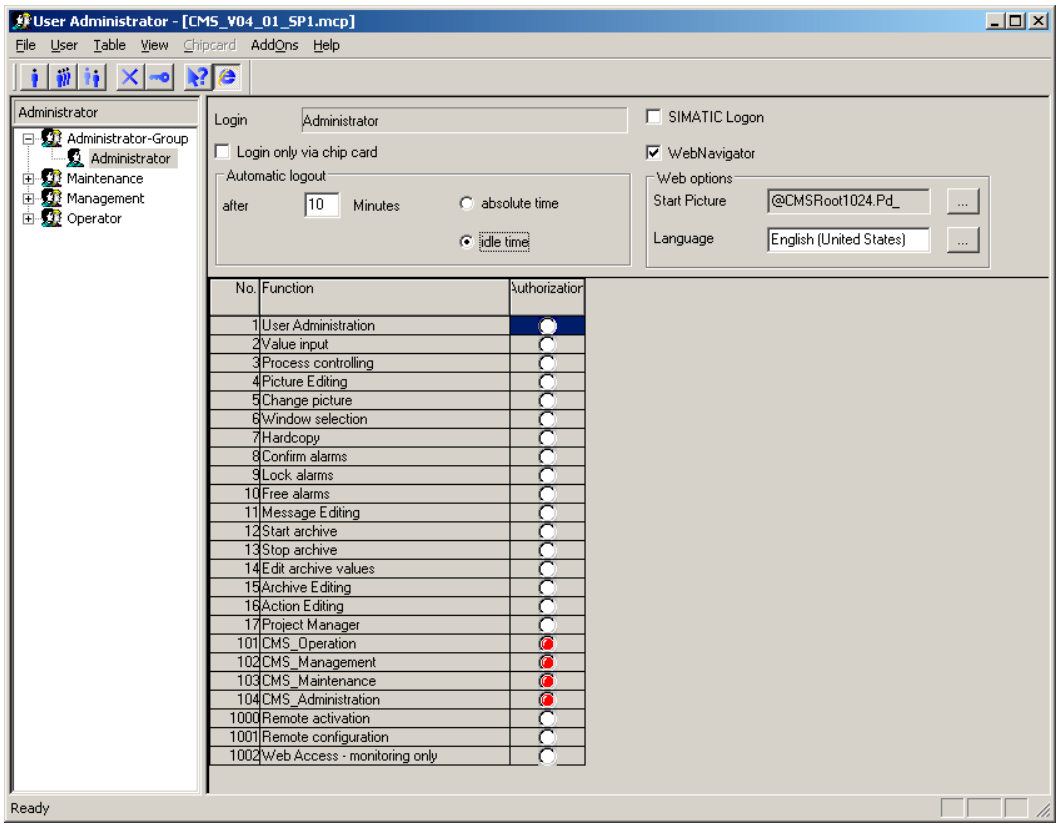


Figure 5-19 WinCC User Administrator

4. Select whether the log-off is to be performed after "absolute time" or after "idle time".

Result

After a certain time interval, a user whom you have defined is automatically logged off. This allows you to avoid situations where unauthorized persons have access to particular functions when the logged-on user forgets to log off.

5.3 Languages

5.3.1 Standard application languages

The CMS / RCMS standard application is supplied in English and German.

If you need other languages to match your application requirements, you will need to arrange for translation of all the texts in the screens.

If you want to run your configured messages in several languages, you will also have to translate the texts in the WinCC Alarm Logging.

Maintenance instructions and references in the CMS editor can only be displayed in one language. This language must be defined during configuration.

Please first check whether the language you need can be displayed by WinCC.

The process described here for working with language-dependent texts only relates to user data. The choice of WinCC user interface languages depends on your WinCC installation.

5.3.2 Language-dependent texts in screens

Initial situation

The texts that are configured in the Graphics Designer are saved with each screen. Using the WinCC Text Distributor, you can export all of the existing texts in the WinCC screens, translate them and import them again in multiple languages.

Processing steps

1. Start the WinCC Text Distributor and select the Graphics Designer.

2. Export one or more existing languages in the txt or csv format. Depending on the size of the project it may take several minutes to export the language texts.

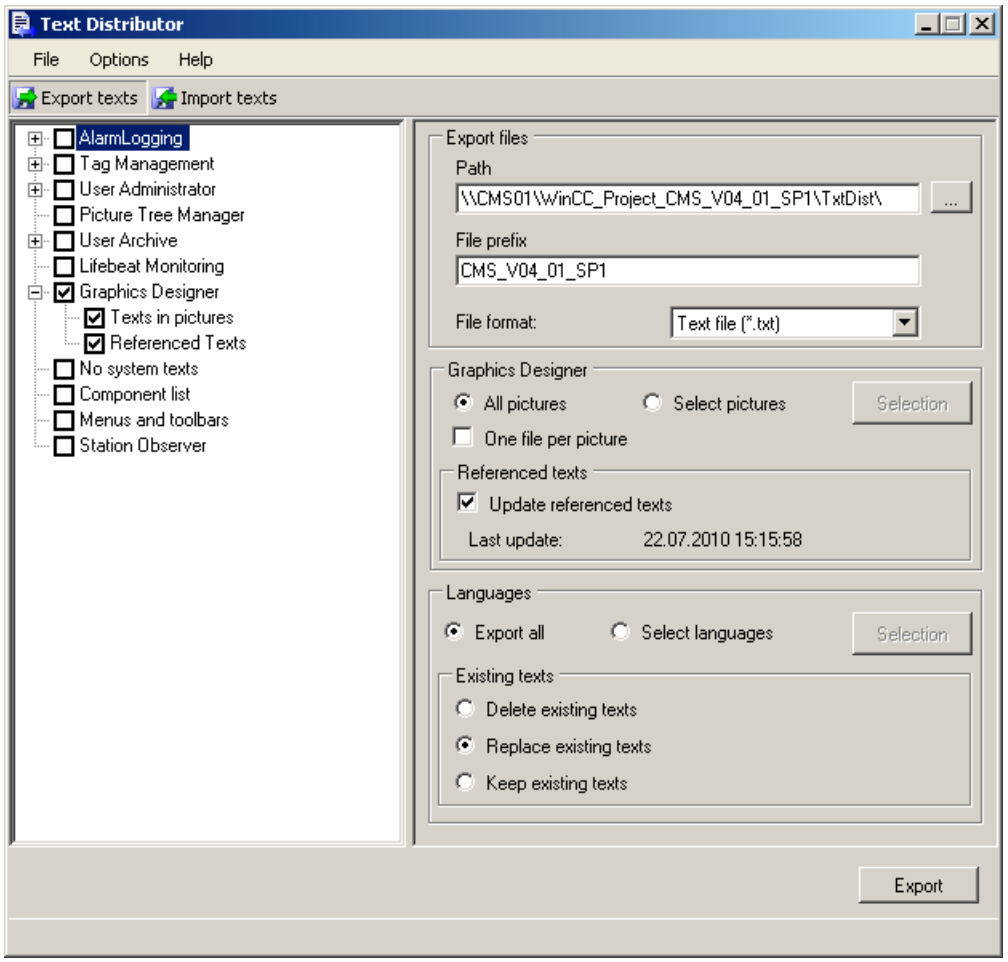


Figure 5-20 WinCC Text Distributor – export screen texts

3. Open the export file in MS Excel using "File" → "Open".
4. Select the exported csv file under "File name" and text files (*.prn, *.txt, *.csv) under "File format". This allows you ensure that MS Excel correctly interprets the dividers in the file.
5. Be sure to retain the format when translating.
6. Once translated, save the file in csv format.
7. Import the edited file using the WinCC Text Distributor. Again here you can choose which language you want to import.

Result

All the texts present in the WinCC Graphics Designer screens are now also available in the language you have configured.

5.3.3 Language-dependent message texts

Initial situation

The alarm/event system texts are stored centrally in the WinCC Text Library.

You can perform the translation of the texts in two ways:

- Analog to the messages via the WinCC TextDistributor
- using the WinCC smart tool "Configuration Tool"

Processing steps

Text Distributor

- Using the export function in the WinCC Text Distributor, you obtain a file in the txt or csv format, which you can translate and then re-import into the text library, as described in Section Language-dependent texts in screens (Page 196). You can choose which message blocks, message classes etc. you wish to export.

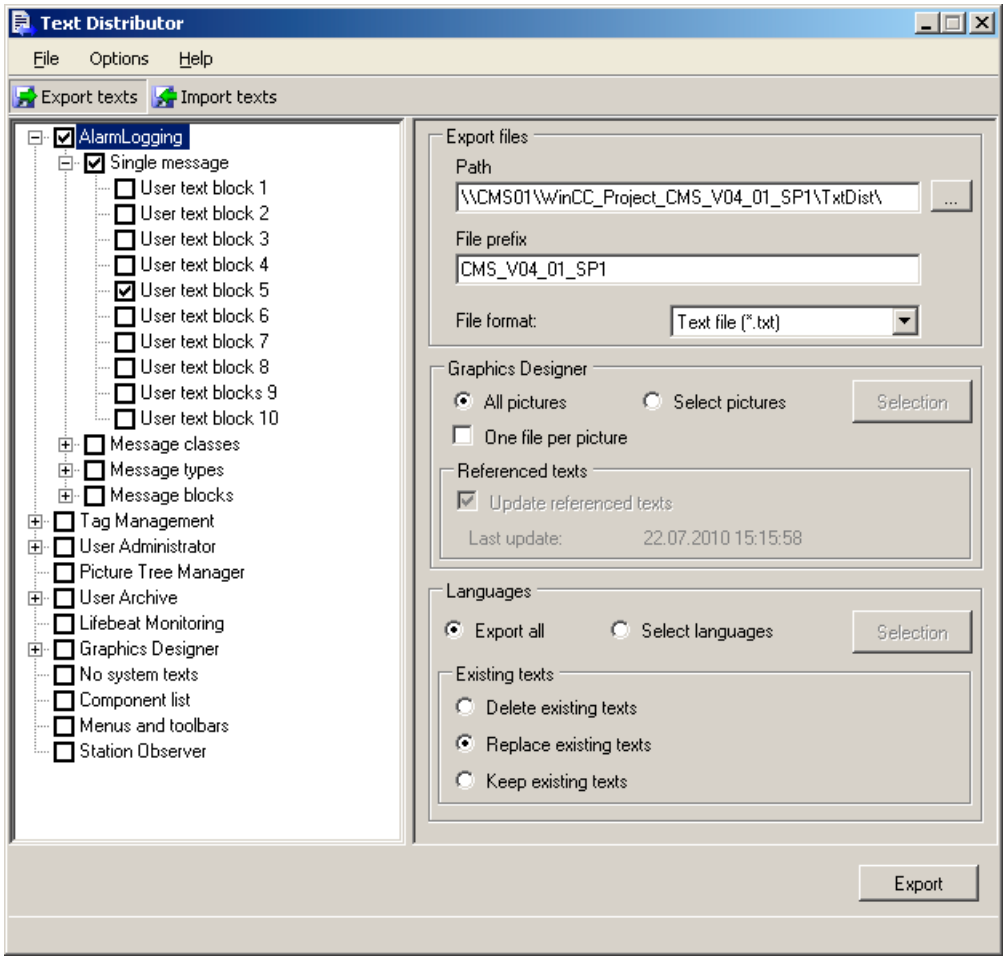


Figure 5-21 WinCC Text Distributor

WinCC Smarttool "Configuration Tool"

- The WinCC smart tool Configuration Tool provides an option for configuring mass data in WinCC (see section Mass data configuration in WinCC (Page 200)) The user interface is MS Excel.
- In MS Excel you can create a project folder for your project.
- The "Texts" sheet is used for the administration of texts in the Text Library. You can add or edit texts and languages here and write straight to WinCC.

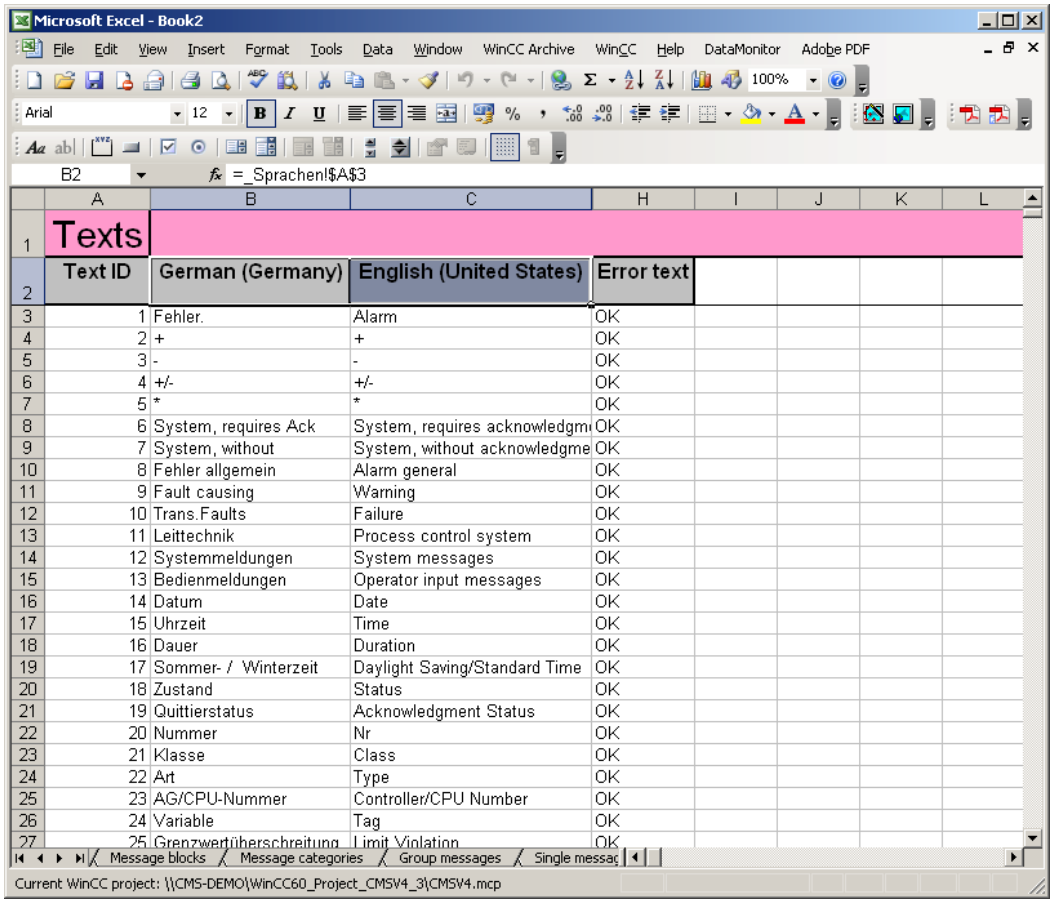

Microsoft Excel - Book2
File Edit View Insert Format Tools Data Window WinCC Archive WinCC Help DataMonitor Adobe PDF
B2
=_Sprachen!A3
Texts
Text ID
German (Germany)
English (United States)
Error text
1 Fehler. Alarm OK
2 + + OK
3 - - OK
4 +/- +/- OK
5 * * OK
6 System, requires Ack System, requires acknowledgm OK
7 System, without System, without acknowledgme OK
8 Fehler allgemein Alarm general OK
9 Fault causing Warning OK
10 Trans.Faults Failure OK
11 Leittechnik Process control system OK
12 Systemmeldungen System messages OK
13 Bedienmeldungen Operator input messages OK
14 Datum Date OK
15 Uhrzeit Time OK
16 Dauer Duration OK
17 Sommer- / Winterzeit Daylight Saving/Standard Time OK
18 Zustand Status OK
19 Quittierstatus Acknowledgment Status OK
20 Nummer Nr OK
21 Klasse Class OK
22 Art Type OK
23 AG/CPU-Nummer Controller/CPU Number OK
24 Variable Tag OK
25 Grenzwertüberschreitung Limit Violation OK
Message blocks
Message categories
Group messages
Single messag
Current WinCC project: \\CMS-DEMO\WinCC60_Project_CMSV4_3\CMSV4.mcp

Figure 5-22 WinCC Configuration Tool, "Texts" table

Result

After the configuration, all user texts in the WinCC Alarm Logging are also available in the language you have configured.

5.4 Mass data configuration in WinCC

The Configuration Tool can be used to create a totally new WinCC project using MS Excel or to edit the data of an existing project. All the tools available in MS Excel can be used to edit the data. For example, the Configuration Tool provides drop-down list fields, a function for automatically completing data, and input instructions during configuration. The Configuration Tool is particularly useful when editing the tag management or Text Library.

If the Configuration Tool is installed, you can use the toolbar in Excel to produce special folders, known as WinCC project folders.

Figure 5-23 WinCC Configuration Tool add-in in MS Excel

Consult the WinCC documentation for how to operate and use the Configuration Tool.

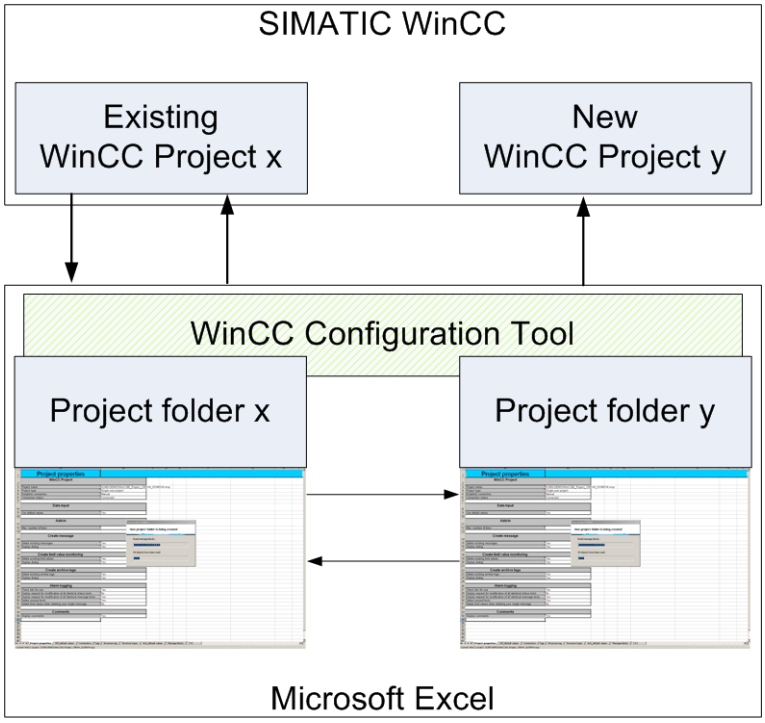


Figure 5-24 WinCC Configuration Tool

Administering hardware and software

6

This chapter describes PC configuration within the entire CMS topology. This includes the computers of the CMS level and the computers of the RCMS level. Two aspects are highlighted during configuration:

- Autostart of the computer and all applications
- Security settings

The PC forms the basis of the SCADA system. Most users should only have access to the operator control and monitoring functions of the CMS application.

6.1 PC configuration of the CMS station

Software installation

- Before installing the software packages, define the definitive name of the computer for the local CMS station.

  Note

  Please note that the computer name cannot be precisely called "CMS".

  You should also observe the WinCC guidelines for the assignment of computer names. If the computer name should be the same as the crane name, then it may contain letters and numbers only. The first character of the computer name must be a letter.

- Assign the computer's IP address according to your network configuration.
- Install the software packages required on the PC. Note the installation instructions for the respective software.

Table 6- 1 Software packages on the local CMS station

Prerequisite	Software component
General	SIMATIC WinCC
	SIMOCRANE CMS for CMS
For Web Navigator access	WinCC / Web Navigator server
Data Monitor use	WinCC / Data Monitor
Trace Option without trace recorder	SIPLUS CMS X-Tools
	CMS Trace Viewer server
	CMS Trace Viewer client
Trace option with trace recorder	[SIPLUS CMS X-Tools (Client)]
	CMS Trace Viewer client

Automatic start

- Autostart of PC as soon as there is a supply voltage: You can define how the PC behaves in its BIOS.
  - Set the boot behavior such that the PC starts up automatically as soon as there is a supply voltage.
- Automatic Windows user log-on
  - Set up automatic user log-on as described in chapter Automatic user logon in Windows (Page 208).
- Automatic activation of the WinCC project: Launch the CMS standard application using the WinCC "AutoStart Configuration" application.
  - From the Windows start menu, start "AutoStart Configuration".
  - Enter the path to the WinCC project in the "Project" field.
  - Set check mark for "Activate Project at Startup".
  - Remove check mark from "Allow "Cancel" during activation".
  - Enter the WinCC AutoStart Configuration application in the Windows autostart ("Add to AutoStart") button.

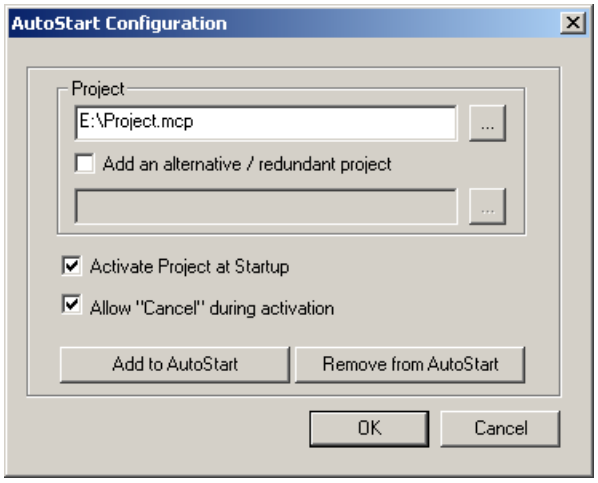


Figure 6-1 WinCC AutoStart Configuration

- Automatic activation of the WinCC options: You can enter the WinCC optional packages and add-ons (e.g. SIMOCRANE CMS) in the WinCC startup list.
  - Use "Computer properties" and "Startup" tab to open the startup list.
  - "Add…" opens the "Applications to add" window.
  - Enter the path and startup parameters of the application you want here.

Security settings

You can make most of the security settings in WinCC-Explorer under "Computer settings".

- Open the "Computer properties" in WinCC Explorer by selecting "Computer" → "Properties".
- Open the "Parameters" tab.
- Under "Disable Keys" you can deactivate a series of shortcuts which the user can use to access Window components from the CMS user interface. Do this by removing the check mark from the selection boxes.

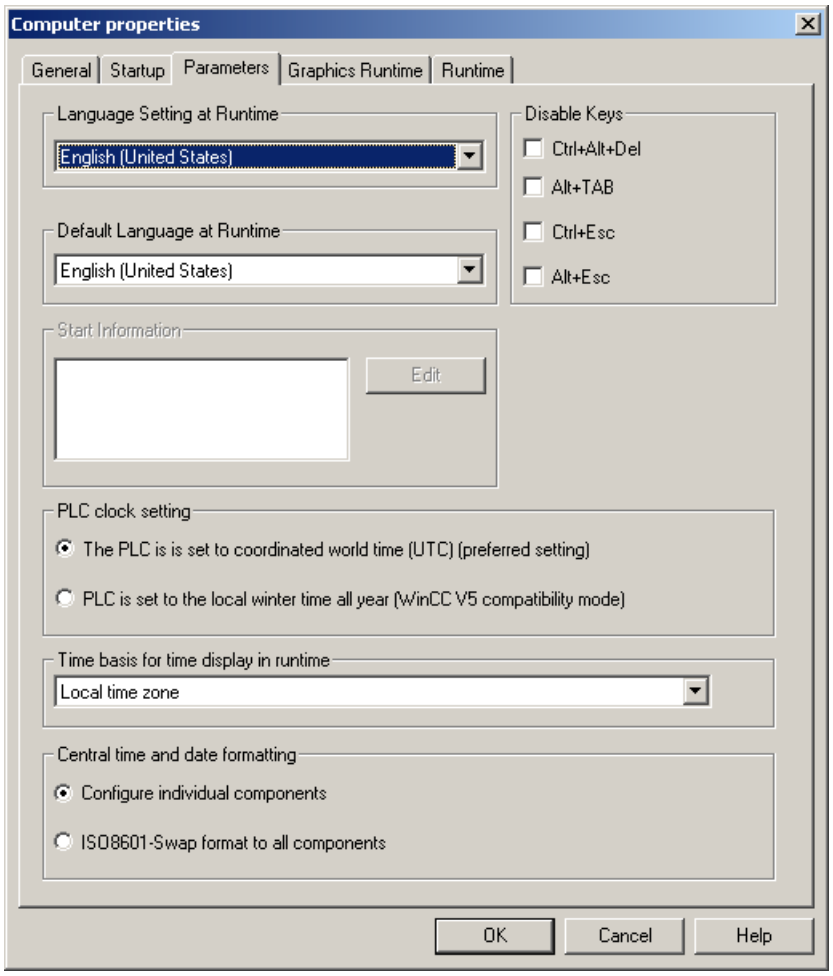


Figure 6-2 WinCC computer properties, "Parameters" tab

- Open the "Graphics Runtime" tab.

- You can set attributes for the graphics window in the "Window Attributes" field. Select the "Full Screen" attribute. The WinCC graphics runtime environment is then shown in full screen. The Windows user interface cannot be seen.
- You can deactivate various functions in the "Turn Off" field. Select the "Alt-F4" function to prevent the user interface being closed using the Alt-F4 shortcut.

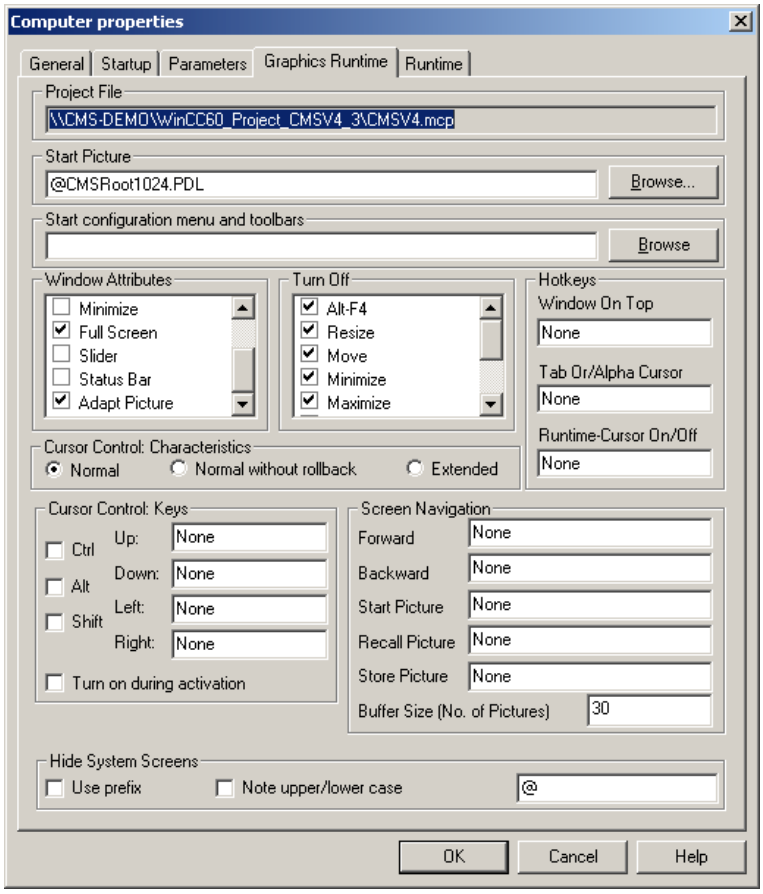


Figure 6-3 WinCC computer properties, "Graphics Runtime" tab

6.2 PC configuration of the web client station

Software installation

1. Before installing the software packages, define the definitive name of the PC for the web client station.
2. Assign the PC's IP address according to your network configuration.
3. Install the software packages required on the PC. Note the installation instructions for the individual components. These software components are:

Table 6- 2 Software packages on the web client station

Prerequisite	Software component
General	WinCC/Web Navigator Client
	SIMOCRANE CMS for the web client
Trace option with or without trace recorder	CMS Trace Viewer client

6.3 Trace recorder

Software installation

1. Before installing the software packages, define the final name of the PC for the trace recorder.
2. Assign the PC's IP address according to your network configuration.
3. Install the software packages needed on the PC. Note the installation instructions for the individual components. These software components are:

Table 6- 3 Software packages on the web client station

Prerequisite	Software component
General	SIPLUS CMS X-Tools server
	[Driver for SIPLUS CMS IONs]
	CMS Trace Viewer server

Automatic start

- Autostart of PC as soon as there is a supply voltage:
  - Configure the boot behavior of the PC as described in section PC configuration of the CMS station (Page 201).
- Automatic Windows user log-on:
  - Set up automatic user log-on as described in section Automatic user logon in Windows (Page 208).

- Autostart of the X-Tools server:
  - Configure X-Tools so that the X-Tools server starts automatically as soon as the PC is booted. For this please observe the instructions in the X-Tools documentation.
- Autostart of the Trace Viewer server:
  - Insert the Trace Viewer server into the Windows start-up list.

Time synchronization

Observe the notes in the X-Tools documentation for time synchronization between the X-Tools client and the X-Tools server PC.

6.4 PC configuration of the RCMS server

6.4.1 RCMS server

Software installation

1. Whenever possible before installing the software packages, define the final name of the PC for the RCMS server.

   Note

   Please note that the computer name cannot be precisely called "CMS".

   You should also observe the WinCC guidelines for the assignment of computer names. If the computer name should be the same as the crane name, then it may contain letters and numbers only. The first character of the computer name must be a letter.

2. Assign the PC's IP address according to your network configuration.
3. Install the software packages required on the PC. For this, please note the installation instructions for the individual components.

Table 6- 4 Software packages on the local CMS station

Prerequisite	Software component
General	SIMATIC WinCC
	SIMOCRANE CMS for RCMS
	SIMATIC WinCC Data Monitor server
	SIMATIC WinCC Down Time Monitor server
In the event of additional central operator stations	WinCC server
Remote access to CMS station	WinCC Web Navigator client

Automatic start

Depending on your project requirements, you can configure the automatic start as described in Chapter PC configuration of the CMS station (Page 201).

Security settings

Depending on your project requirements, you can configure the security settings as described in Chapter PC configuration of the CMS station (Page 201).

NOTICE
Note that for the RCMS server, different security and availability preconditions apply than for a CMS station.

6.4.2 RCMS operator station

Software installation

1. Whenever possible before installing the software packages, define the definitive name of the PC for the RCMS operator station.
2. Issue the computer's IP address according to your network configuration.
3. Install the software packages required on the PC. For this, please note the installation instructions for the individual components.

Table 6- 5 Software packages on the local CMS station

Prerequisite	Software packages
General	SIMATIC WinCC
	SIMOCRANE CMS client
	SIMATIC WinCC Data Monitor client
	SIMATIC WinCC Down Time Monitor client
Remote access to CMS station	WinCC Web Navigator client

Automatic start

Depending on your project requirements, you can configure autostart as described in PC configuration of the CMS station (Page 201).

Security settings

Depending on your project requirements, you can configure the security settings as described in PC configuration of the CMS station (Page 201).

NOTICE
Note that different security and availability preconditions apply to the RCMS server PC compared with those of a CMS station.

6.5 User administration

6.5.1 Information for Windows users

You must set up one main user and password on all PCs.

- Create a user with the same username and password on the RCMS server station as well as all the CMS stations.
- The user must have administrator rights.
- Refer to the WinCC documentation to check all other user rights required.

Users when using the Data Monitor

As soon as you want to use the "Trends and Alarms", "Reports" or "Webcenter" functions with WinCC Data Monitor, you will need a user in the MS Windows operating system. Two user groups are set up automatically when installing the Data Monitor: "DM_ADMIN" and "DM_USER". Users of the DM_ADMIN group have administrator rights in the Data Monitor and can access and edit all data.

1. Start the Windows user administration.
2. Create a new user (e.g. Name/Password "DataMonitor") or use an existing user.
3. Assign the user to the "DM_ADMIN" or "DM_USER" user group for using the Data Monitor options on the local CMS station.

6.5.2 Automatic user logon in Windows

You can set up automatic logon for a Windows user upon the system starting in the user accounts:

1. Select "Start" → "Run" → "control userpasswords2" to access the "User accounts".

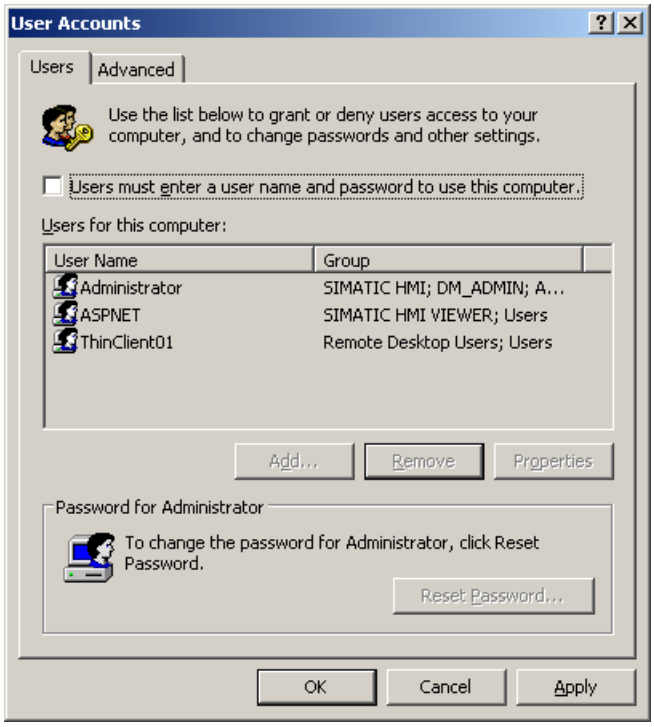


Figure 6-4 Windows user accounts

2. Remove the check mark from "User must enter a user name and password to use this computer".
3. When you click on "OK", the dialog appears for entering the user who is to be automatically logged on when the computer starts.
4. Enter the user's name and password for logging on.

Time synchronization 7

7.1 CMS station – controller

If you read the data from the crane controller with time stamp, then you must ensure that the time in the controller runs in UTC (Universal Time Coordinated). In the "Global Script" editor on the CMS standard application, you will find a global c action ("PLCTimeSynchronisation.PAS"), which sets the time of an S7-controller to the PC time.

The trigger of the action is not active. To be able to use the action, you need to

- Prepare the interface on the SIMATIC S7 (see CMS interface documentation, SIMOCRANE_CMS_interface_eng.pdf → Group: "TimeSync". You will find the document on the installation CD).
- When starting the S7, execute the action (tag: "blnTriggerPLCStartup" → Group: "TimeSync").
- In addition, initiate the action cyclically (e.g. "Hourly").

7.2 PC time synchronization

As soon as you are using several PCs in a network – which are exchanging data between themselves – you also need to ensure Windows time synchronization in addition, e.g.:

- CMS station ↔ RCMS server
- CMS station ↔ Trace recorder

Note

If you use the trace option, please read the notes in the SIPLUS CMS documentation on time synchronization (see the SIPLUS CMS4000 X-Tools User Manual, Edition 2010/06).

Service and maintenance

8

8.1 Checking the data volume

8.1.1 Buffer for XML files

The buffer for the XML files can be limited in the CMS editor. CMS Runtime not only deletes the XML files in the transfer directories, but also deletes the files in the lower-level error directories, which are older than, for example, 30 days.

1. Open the "Computer" tab under System → Basic settings.
2. In the field "Maximum XML buffer" enter the number of days for which the XML files are to be saved (e.g. 30 days).
3. Using the button "Clear buffer", you can empty the entire buffer with a single click.

8.1.2 Limitation of the used disk space

The CMS Runtime monitors the disk space as soon as you have activated CMS-RCMS data synchronization on the basis of XML files.

- Open the "Computer" tab under "System" → "Basic settings" in the CMS editor. You can enter the reserved value in megabytes ("MB") in the "Minimum disk space" field.

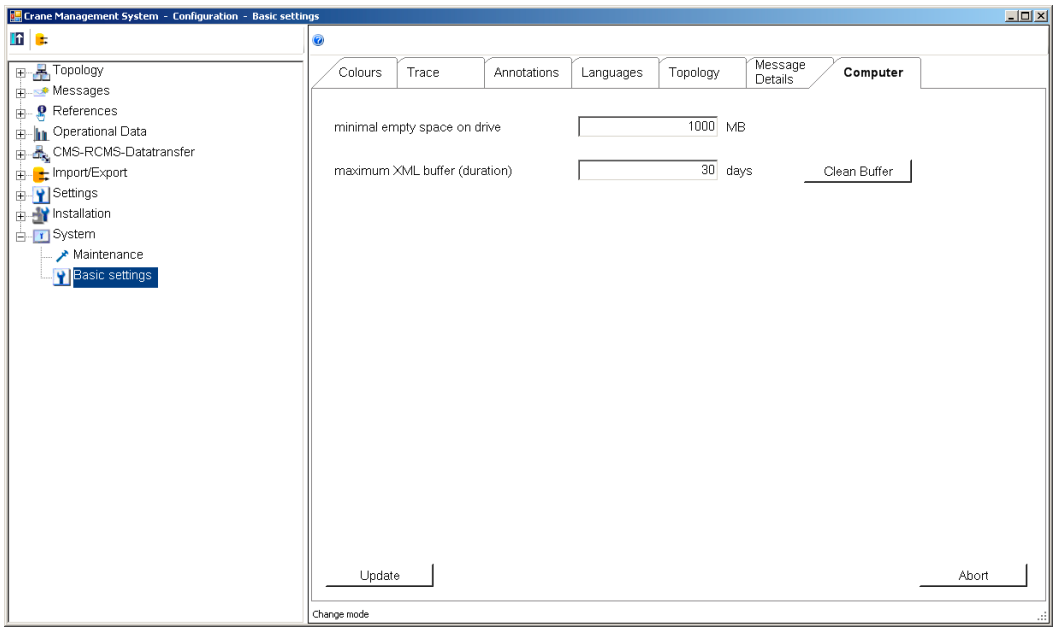


Figure 8-1 Reserving disk space

8.1.3 Log files

The CMS Runtime produces log files on the local crane station to output error messages, operating processes and import processes. The error log (*.err) only contains an entry if an error has occurred. The trace (*.out) very quickly absorbs a huge volume of data because the CMS Runtime writes a lot of output to the file for diagnostics purposes. A new file is created in the specified directory for each month. The default setting for the directory creates the log files in the "CMS" sub-folder in the WinCC project directory.

You can block or re-enable the output to the log files in the CMS editor. We would strongly recommend blocking the outputs to the trace log file during operation and only using this diagnostic function for commissioning. If you don't do this, huge volumes of data will collect because old files are not automatically deleted.

You can also prohibit the output of error logs to the error file.

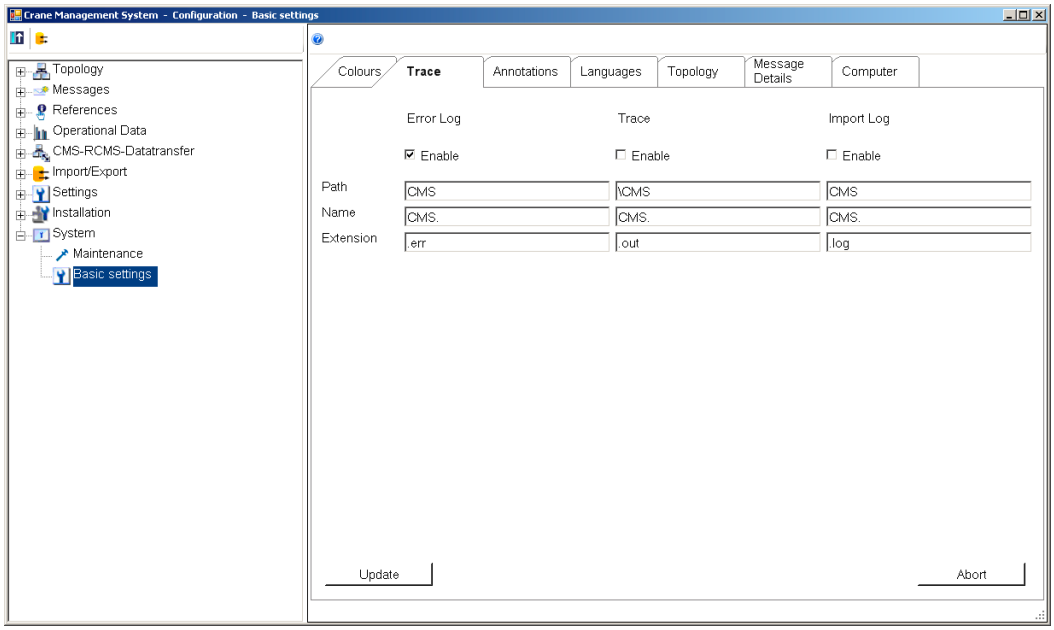


Figure 8-2 Enabling/blocking log files in the CMS editor

1. Open the CMS editor in WinCC Explorer.
2. Navigate to "System" → "Basic settings" → "Trace".
3. Remove the check mark from the "Enable" box for "Trace" and also for the "Error Log" and "Import Log" if necessary.

8.2 Data archiving and backup

8.2.1 Backup of WinCC messages

Messages archived in WinCC can be swapped out of the archive database (WinCC Alarm Logging) as a backup. You can configure the swap-out in the archive manager of WinCC Alarm Logging.

8.2.2 Backup of WinCC process values

Process values in WinCC can be swapped out of the archive database (WinCC Tag Logging) as a backup. You can configure the swap-out in the archive manager of WinCC Tag Logging.

8.2.3 Backup of user data in the CMS editor

You can save all your user data in the CMS editor as a backup.

You will find the backup function under "Settings" → "Maintenance". Here you can back up data, restore backed up data and reset the CMS database contents to the CMS delivery condition.

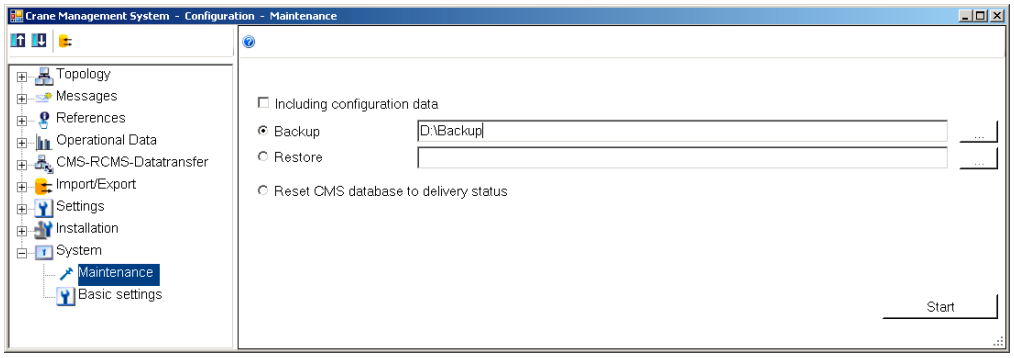


Figure 8-3 Backup of user data in the CMS editor

Appendix A

A.1 Design guidelines

A.1.1 Introduction

The design guidelines form the basis of the CMS standard applications in the interests of creating a standard and easily recognizable look and feel. The guidelines relating to the external look of the user interface should apply to all crane applications both on the crane itself and as the central terminal application.

The user interface should always ensure user-friendly operation. The needs of different end users (crane drivers, maintenance technicians, terminal operators) should be satisfied in particular. The design guideline aims to provide simple rules and concepts to also simplify configuration.

A.1.2 Screen design and layout

The layout of the CMS standard applications deviates from the standard WinCC screen design. The concept is based on the idea of always giving the viewer a familiar framework which helps him or her find their way around the CMS user interface.

Symbolic displays rather than realistic graphics:

One design aspect is the use of simple but meaningful symbols to display screen objects. Using just a few graphic details produces an independent look.

Reduction in volume of information on display

The less information is displayed, the faster it can be taken in by the observer. The user interface screens shouldn't be used to pack as much information as possible onto the screen area provided. On the contrary, that information which the crane driver or service technician needs to reliably perform his work is displayed. Detailed information can also be called up if necessary.

Touch operation

The CMS is designed for touch operations, i.e. a mouse isn't used, the user simply touches the on-screen keypad. In terms of size, the control buttons are large enough that they can be operated by people wearing gloves. Simple settings can usually be undertaken using just one button.

A.1.3 Navigation

All screen navigation in the user interface is controlled using internal tags and picture windows. The user interface is split by hierarchy into four levels. All screen windows are located in the @CMSRootxyz.pdl start screen. A picture tag is assigned to each picture window, which dynamizes its screen content. The tag content is controlled using the navigation bars for the first and second screen levels and using elements in the screen content for the third and fourth levels.

The fourth level simply contains the selection dialogs for the user.

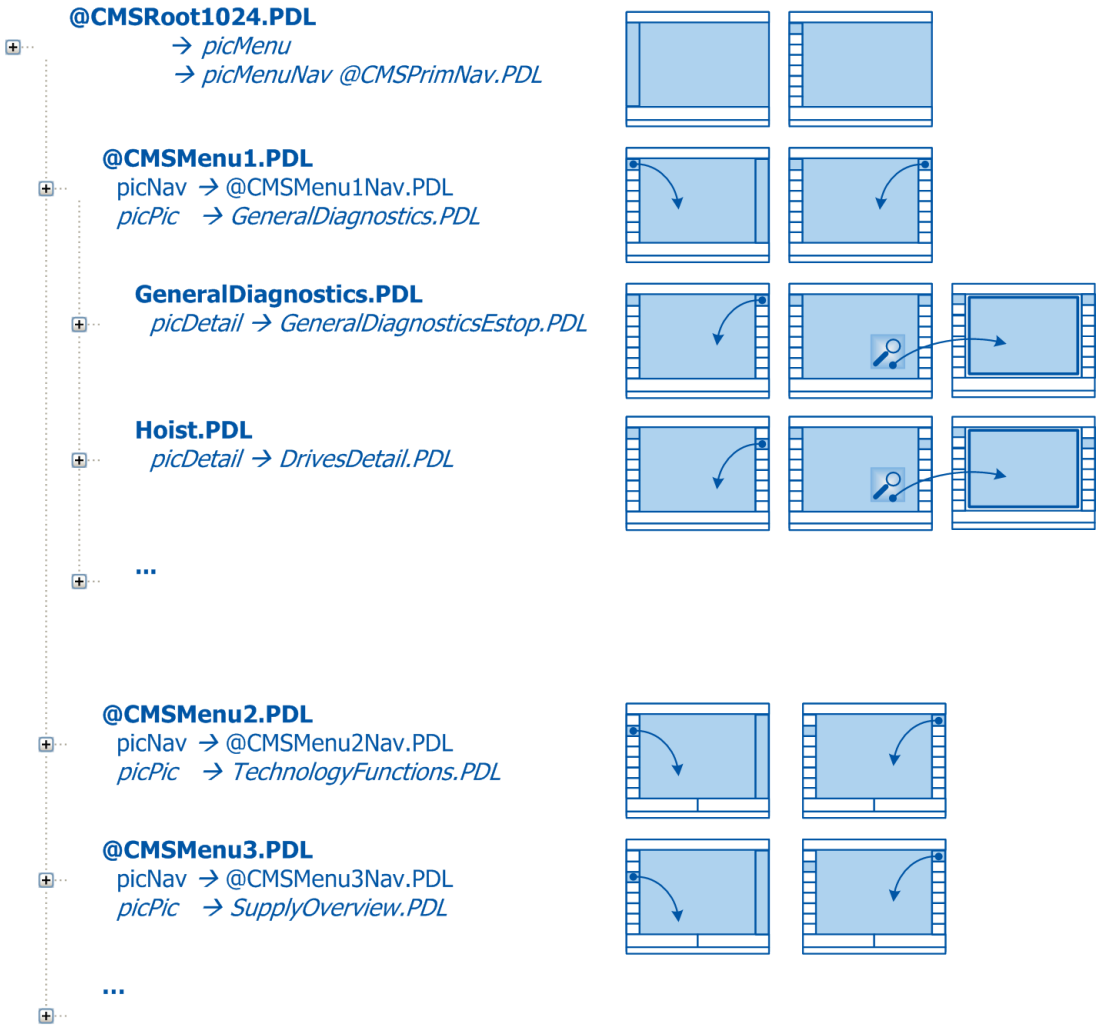


Figure A-1 Navigation

A.1.4 Color scheme

The color palette for the user interfaces has been reduced to a limited number of colors, based on the workbench design.

The static elements or normal operating modes are shown in a few colors from one family of colors (gray). Their job is to show the position of the components and not to stand out from the background.

Process values within the normal range and normal component operating modes are indicated by a few colors of another family of colors (blue) which clearly do stand out from the static background.

These unobtrusive gray and blue shades put the least strain on the human eye.

Using unobtrusive colors for static elements and normal operating modes means that the observer can quickly see fault states which stand out due to the use of high-contrast color shades when the components are not the focus of his or her field of vision.

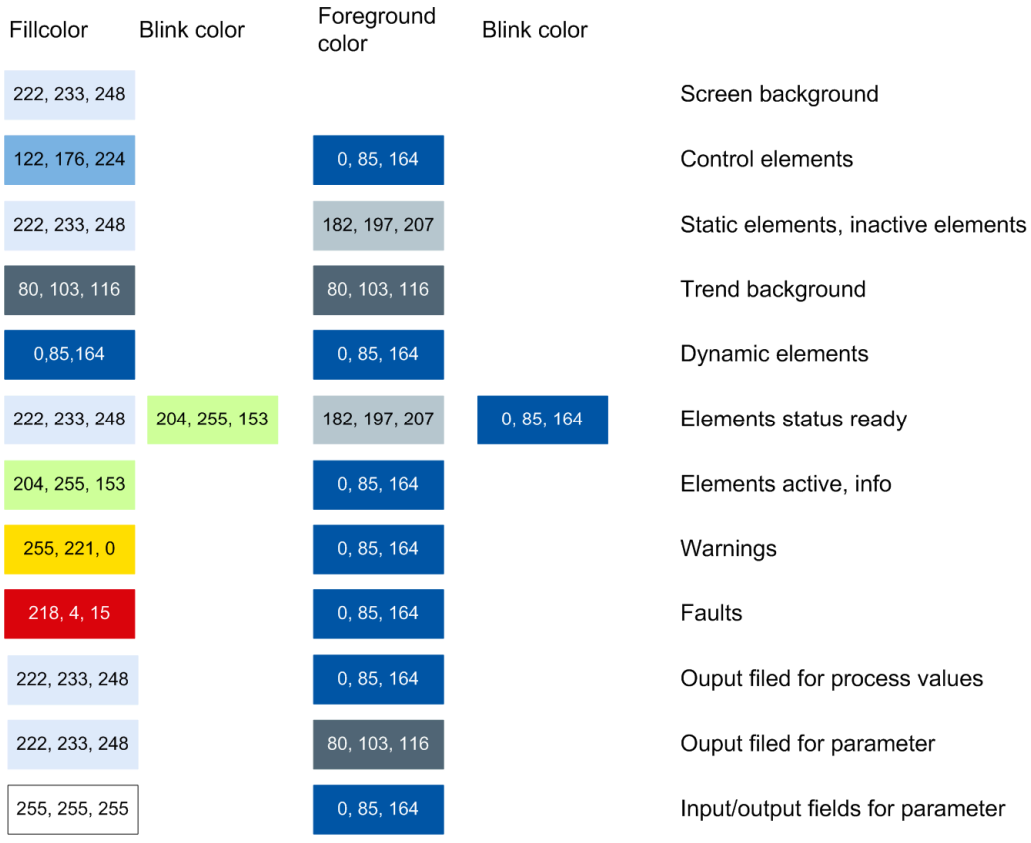


Figure A-2 CMS color palette

A.1.5 Naming conventions

Naming conventions for all parts of the project make it easier for the configuration to be traced. When using WinCC and its extensive functionality as a SCADA system, it is a good idea to observe the guidelines for naming throughout the project.

The naming conventions include:

- Tag names in the tag management (external and internal tags)
- Screen names for WinCC graphics
- Procedure names for project functions and actions
- Tag names within procedures
- Names for objects in WinCC graphics

The following applies: The more meaningful the element designations, the easier it is to navigate in a project. All designations are in English. Note that it is very hard to read extremely long names. We would therefore recommend using clear abbreviations for long names which are used frequently (e.g. "Res" for reset). But if using an abbreviation be sure to consistently use this abbreviation for the same expression.

The names are structured so that individual words are split by using a combination of upper and lower case (e.g. blnMoveTrigger).

Naming convention for tags

Tags in the tag management for the automation system or within procedures are designated such that both their type and wherever possible the components they are assigned to are clearly recognizable. Both parts are preceded by a meaningful designation.

Type + component + designation → e.g.: blnMoveTrigger

In scripts all WinCC tags used are defined at the start (#define). The prefix for the tags in the definition section is "tag".

Table A- 1 Naming conventions for tags

Type	Type abbreviation as prefix	Example
Bool(ean)	bln	blnMoveTrigger
Byte	byt	bytHoistStateMotor
Short	srt	srtHoistCurrent
Word	wrd	wrdHoistStateDrive
Integer	int	intHoistCurrent
Double Word	dwd	dwdCounterReset
Long	lng	lngHoistDistance
Character	chr	chrPictureName
Tag	tag	tagPictureName

Naming convention for internal system tags

The internal CMS system tags are used for screen navigation, selecting objects or for general settings. They have the @CMS prefix. This prefix suggests that a system tag labeled in this way should be neither deleted nor changed. If they are deleted or changed, malfunctions may arise within the screens.

@CMS + designation → e.g.: @CMSMainPic

Naming convention for WinCC graphics

Just the same as the designation of internal tags, all CMS navigation screens in a standard application start with the system prefix @CMS, e.g. @CMSMenu1.PDL.

Naming conventions for objects in WinCC graphics

Regardless of the HMI product used, as well as observing the conventions for naming tags and scripts, attention should also be paid to conventions for naming screen objects. Through the introduction of graphic standard objects (such as square-wave, line etc.), most HMI products support an object-focused development process.

The function of an object can therefore be recognized in the way all objects are depicted in the screen. Incorrectly inserted objects, which bear the standard name, can also be delimited.

The table below shows naming conventions for objects in WinCC screens.

Table A- 2 Naming conventions for screen objects

Type	Type abbreviation as prefix	Example
Button	btn	btnCloseWindow
Control	ctrl	ctrlTrend
Graphic Object	gco	gcoCrane
Line	lin	linBorder
Picture Window	pic	picMainWindow
Rectangle	rcl	rclBorder
Status Display	std	stdMotor1
Text	txt	txtCounterName

Naming conventions for procedures ("Scripting")

The body of all tag / procedure names should be meaningful and reflect the tag function as well as possible. Procedure names should also start with a verb which contains the functionality realized, such as "InitNameArray" or "CloseDialog".

A.1.6 Code conventions

Code conventions are suggestions which aim to help you write VBS or C code for procedures and actions.

All the procedures (project functions) and global actions created should start with a brief comments header (see below), which briefly summarizes their functionality. Detailed descriptions should be moved to the code itself so that minor changes to code do not have to be constantly made in the header.

Function parameters in particular should be described in the header if their function is not clear from the name or if the procedure only permits certain values or value ranges. The same applies to return values and WinCC tags which are changed by the procedure.

Another key component of the comment header is the tracking of changes, with a product brief of the modifications made and an entry for the date and author for possible queries.

```
////////////////////////////////////////////////////////////////
// Author:
//
// Version:
//
// Date:
//
// Function:
//
// Parameters:
//
// Return values:
//
////////////////////////////////////////////////////////////////

////////////////////////////////////////////////////////////////
//
// Change Log:
//
//    -DATE-          -AUTHOR-          -DESCRIPTION-
//
////////////////////////////////////////////////////////////////
```

A.1.7 Conventions for the screen structure

Screen levels

When producing the screen structure in the WinCC Graphics Designer, we would recommend using the WinCC principle of levels. The principle improves clarity during configuration.

Levels 1-7 were given preference in application projects. The conventions shown in the table have been used in these. In exceptional cases (due to the nesting of objects), there have been deviations from the convention:

Description	Level
Static background elements, screen frame	1-2
Static texts	2-3
Dynamic screen elements which cannot be operated	4
Screen elements which can be operated	5
Controls	6
Screen window	7
Faceplates and types	8
Superimposed elements	12
Invisible elements	15

Font sizes

To ensure a standard look, it is essential to keep the font sizes uniform. The following font sizes have been used in CMS standard applications for a screen resolution of 1024 x 1280:

Designation	Size	Bold	Underlined	Use
Standard text	14	+	-	Standard I/O fields, standard texts
Standard title	14	+	+	Title for linked groups of I/O fields
Window title 1	16	+	-	Window title of detail and dialog windows
Text 1	18	+	-	Highlighting of important information / process values (I/O fields, texts)

A.2 Bibliography

SIMOCRANE, Crane Management System (CMS), Operating Instructions, Edition 03/2011

SIPLUS CMS, SIPLUS CMS4000 X-Tools, Edition 06/2010